TREASURY OF FACTS

W. J. KING

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TREASURY OF FACTS.

A CYCLOPÆDIA

OF

NATURAL AND MATHEMATICAL SCIENCE

WITH

THE ART AND SCIENCE OF TEACHING.

EMBRACING

A COMPLETE OUTLINE OF ORTHOGRAPHY, ETYMOLOGY, ELOCUTION, GRAMMAR, RHETORIC, LOGIC, UNITED STATES HISTORY, GEOGRAPHY, PHYSICAL GEOGRAPHY, GEOLOGY, BOTANY, ZOOLOGY, PHYSIOLOGY, NATURAL PHILOSOPHY, MENTAL PHILOSOPHY, CHEMISTRY, GOVERNMENTAL SCIENCE, ARITHMETIC, ALGEBRA, GEOMETRY, TRIGONOMETRY, ASTRONOMY, METHODS OF INSTRUCTION, AND THE SCIENCE OF TEACHING.

BY W. J. KING.

DEC 24 1884
CITY

NEW YORK:
A. LOVELL & CO., PUBLISHERS.
1884.

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PREFACE.

THE author of this little volume, having been actively engaged in the work of teaching for many years, has felt the need of a text-book adapted to the school work of all grades, and more particularly required in the higher grades and normal schools; a text-book that would engender habits of thought on the part of pupils and aid them to develop subjects naturally and logically; one that would present at a glance the correct outlines of the subjects and give the leading principles of the various branches taught in our schools. Such a text-book the author believes this to be.

While it may not be complete *in itself*, by a little elucidation of the subjects on the part of the instructor, and a careful study of the outlines and principles on the part of the pupils, a *fair* knowledge of each branch may be gained without reference to any other text-book.

More particularly is it calculated to be supplementary to ordinary text-books. Its classified arrangement of topics and facts saves much unnecessary labor on the part of pupils.

This volume is offered to the public with the hope that it may be found essential to both teachers and pupils. Should it create a taste for scientific investigation and classified knowledge on the part of scholars the highest aims of the author will be attained.

W. J. KING.

BENEZETTE, PA.,
April 1, 1884.

TO TEACHERS AND OTHERS WHO MAY USE THIS BOOK

THE author wishes to offer a few suggestions with reference to the manner of using this book.

The book is not designed as a text-book, exclusive of any other, but rather as a supplementary book to use in connection with *any other* text-book. All the facts are here arranged logically, as bases for lessons topically. To illustrate: In United States History, the lesson assigned is Discoveries as a general topic. Subdivided, the first division is by Columbus, then his early life, etc. Allow the pupils to gather information from any source whatever. They may, in their investigation, examine several authors upon the same subject, and thereby increase their knowledge to a greater degree than if simply following the method of question and answer.

Do not attempt too much: only a few topics at each lesson thoroughly elaborated, and at the close, or the opening of the lesson, require the reproduction of the outline by the class, using the black-board. All the dates given, and principles, should be memorized, and the principles, whether philosophical or mathematical, should be rigidly demonstrated and applied to practical problems.

This book, while it conforms to no text-book, will be found to agree with all in the facts and principles given; hence it can be successfully used in connection with any series of text-books.

In teaching primary scholars this book will greatly facilitate the work of the teacher by producing the foundations for oral instruction. If judiciously used, it will create an interest on the part of pupils throughout the whole course of study that can be attained in no other way. The sciences can, by following this plan, be taught to the youngest pupils. The teacher can also make this book a fruitful

source of information by using the facts stated for bases of general remarks. At times when the interest seems to lag, place a topic or two upon the black-board, and in a very few minutes of elucidation the school will have been awakened, and the next day will reproduce the whole subject-matter presented. The author has no hesitancy in saying, that if teachers will use this book in the manner suggested they will accomplish grand results, even in the primary schools.

Those persons who may use the book as a means of acquiring instruction without the aid of a teacher will find, by carefully studying the outlines here given, and occasionally referring to any text-book they may have for the details upon the data contained in this, they will become familiar with the subjects in a much shorter time than if they pursued the course generally pursued by students, for a large amount of matter contained in all text-books, which to a great degree embarrass the learner, is here omitted. Only facts are stated, and generalizations are left entirely out.

These facts stand out as finger-boards to guide the seeker after truth just where he should look, and point out to him just those things for which he should look in any text-book.

That you may find this book a most valuable help to prosecute your arduous labors, either as teachers or private students, is the wish of the author.

W. J. KING.

Benezette, Pa.,
April 1, 1884.

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- II. Classification of words.
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  - 2. Triphthongs.
- 2. *Consonants.*
  - 1. Mutes.
  - 2. Semivowels.
  - 3. Liquids.
- 3. *Capitals.*
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  - 2. Uses. }
- 4. Small letters (see ante, page 1).

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- 2. According to form (see ante, page 2).
- 3. According to use, and—1. NOUNS.

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- 1. *Classes.*
  - 1. Common.
    - 1. Collective.
    - 2. Abstract.
    - 3. Verbal.
  - 2. Proper.
- 2. *Properties.*
  - 1. Gender.
    - 1. Masculine.
    - 2. Feminine.
    - 3. Common.
    - 4. Neuter.
  - 2. Person.
    - 1. First.
    - 2. Second.
    - 3. Third.
  - 3. Number.
    - 1. Singular.
    - 2. Plural.

- I. NOUNS.
  - 2. *Properties.*
    - 4. Case.
      - 1. Nominative.
        - 1. Common.
        - 2. Independent.
        - 3. Absolute.
        - 4. Apposition.
        - 5. Predicate.
      - 2. Possessive.
      - 3. Objective.
        - 1. After a verb.
        - 2. After a preposition.
        - 3. By apposition.
- II. PRONOUNS.
  - 1. *Classes.*
    - 1. Personal.
      - 1. Simple.
      - 2. Compound.
    - 2. Relative.
      - 1. Simple.
      - 2. Compound.
    - 3. Interrogative.
    - 4. Responsive.
    - 5. Adjective.
      - 1. Distributive.
      - 2. Demonstrative.
      - 3. Indefinite.
      - 4. Reciprocal.
  - 2. *Properties.*
    - 1. Gender.
    - 2. Person.
    - 3. Number.
    - 4. Case.

    See above.
- III. ADJECTIVES.
  - 1. *Classes.*
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      - 1. Common.
      - 2. Proper.
      - 3. Participle.
      - 4. Compound.
    - 2. Definitive.
      - 1. Numeral.
        - 1. Cardinal.
        - 2. Ordinal.
        - 3. Indefinite.
        - 4. Multiplicative.
      - 2. Pronominal.
        - 1. Distributive.
        - 2. Demonstrative.
        - 3. Indefinite.
  - 2. *Comparison.*
    - 1. Positive.
    - 2. Comparative.
    - 3. Superlative.
- IV. VERBS.
  - 1. *Classification.*
    - 1. According to their form.
      - 1. Regular.
      - 2. Irregular.
      - 3. Redundant.
      - 4. Defective.
    - 2. According to their syntax.
      - 1. Not finite.
        - 1. Participles.
        - 2. Infinitives.
      - 2. Finite.
    - 3. With reference to the object.
      - 1. Transitive.
      - 2. Intransitive.
    - 4. With reference to each other.
      - 1. Principal.
      - 2. Auxiliary.
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    - 1. Voice.
      - 1. Active.
      - 2. Passive.
    - 2. Mood.
      - 1. Indicative.
      - 2. Potential.
      - 3. Subjunctive.
      - 4. Imperative.
    - 3. Tense.
      - 1. Present.
      - 2. Present perfect.

- IV. Verbs.
  - 2. *Properties.*
    - 3. Tense.
      - 3. Past.
      - 4. Past perfect.
      - 5. Future.
      - 6. Future perfect.
    - 4. Forms of the tenses.
      - 1. Common.
      - 2. Emphatic.
      - 3. Passive.
      - 4. Progressive.
      - 5. Ancient.
      - 6. Interrogative.
      - 7. Negative.
    - 5. Person.
      - 1. First.
      - 2. Second.
      - 3. Third.
    - 6. Number.
      - 1. Singular.
      - 2. Plural.
    - 7. Principal parts.
      - 1. Present tense.
      - 2. Past tense.
      - 3. Present participle.
      - 4. Perfect participle.
  - 3. *Synopsis.*
  - 4. *Conjugation.*
- V. Prepositions.
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  - 2. *Principal word.*
- VI. Adverbs.
  - 1. *Classes.*
    1. Of time.
    2. Of place.
    3. Of degree.
    4. Of manner.
    5. Of cause.
    6. Of extent.
    7. Of quantity.
    8. Of addition.
    9. Of exclusion.
    10. Of emphasis.
    11. Of negation.
  - 2. *Properties.*
    - 1. To modify.
    - 2. To connect.
  - 3. *Forms of comparison.*
    - 1. Positive degree.
    - 2. Comparative.
    - 3. Superlative.
- VII. Conjunctions.
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  - 2. *Disjunctive.*
- VIII. Interjections.
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  5. Of contempt.
  6. Of dislike.
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  12. Of intensity.
  13. Of wonder.

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      - 2. Adverbs.
    - 2. Modifying words.
  - 2. *Phrasal.*
    1. Substantive phrase.
    2. Subjective phrase.
    3. Objective phrase.
    4. Adverbial phrase.
    5. Adjective phrase.
    6. Prepositional phrase.
    7. Simple phrase.
    8. Complex phrase.
    9. Compound phrase.
  - 3. *Clausal.*
    1. Independent clause.
    2. Substantive clause.
    3. Subjective clause.
    4. Dependent clause.
    5. Adjective clause.
    6. Adverbial clause.
    7. Subjunctive clause.
    8. Objective clause.
    9. Simple clause.
    10. Complex clause.
    11. Compound clause.
- II. Synthesis of sentences.
  - 1. *Elements.*
    - 1. Subject.
      - 1. Simple.
      - 2. Compound.
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      - 1. Simple.
      - 2. Compound.
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  - 2. *Complex.*

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3. Imperative.
4. Exclamatory.

- III. Classes of sentences.
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  2. Name properties.
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10. *Hyphens.*
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3. Avoid barbarism.
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5. Form new words.
6. Avoid impropriety.
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2. Should be clear in language.
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    - 1. To express interrogation.
    - 2. To express exclamation.
    - 3. From negative to positive.
    - 4. From direct to indirect.

CHAPTER III.—PUNCTUATION.

- I. The necessity for.
- II. Points.
  - 1. *Grammatical.*
    - 1. Comma.
    - 2. Semicolon.
    - 3. Colon.
    - 4. Period.
  - 2. *Rhetorical.*
    - 1. Interrogation.
    - 2. Exclamation.
    - 3. Dash.
    - 4. Parenthesis.
    - 5. Quotation.
  - 3. *Printer's marks.*
    - 1. Of accent.
    - 2. Apostrophe.
    - 3. Braces.
    - 4. Caret.
    - 5. Cedilla.
    - 6. Brackets.
    - 7. Diæresis.
    - 8. Ellipsis.
    - 9. Emphasis.
    - 10. Hyphen.
    - 11. Leaders.
    - 12. Leads.
    - 13. Paragraph.
    - 14. Quality marks.
    - 15. Reference marks.
    - 16. Section marks.
    - 17. Tilde.

CHAPTER IV.—CAPITALS.

- I. Kinds.
  - 1. Common.
  - 2. Roman.
  - 3. Italics.
  - 4. Old English.
  - 5. German text.

II. USES.
1. First Words.
2. Headings.
3. Quoted Titles.
4. Names of Deity.
5. Biblical terms.
6. Proper Names.
7. Derivatives from Proper Names.
8. Titles of office and Honor.
9. Personification.
10. Pronoun I.
11. Interjection O.

CHAPTER V.—CRITICISM.

I. THE NECESSITY FOR.

II. THE KINDS OF.
1. *Absolute, including style.*
2. *Relative, including taste.*
   1. Quality of taste.
   2. Variation of taste.
   3. Cultivation of taste.
   4. Universality of taste.
   5. Catholicity of taste.
   6. Pleasures of taste.

CHAPTER VI.—COMPOSITION.

I. PROSE.
1. *Descriptions.*
2. *Narrations.*
   1. Purpose of.
   2. Kinds.
      1. Didactic.
      2. News.
      3. Business.
      4. Official.
      5. Of introduction.
      6. Of friendship.
      7. Notes.
   3. Parts.
      1. Superscription.
      2. Body.
      3. Subscription.
      4. Address.
3. *Letters.*
4. *History.*
5. *Biography.*
6. *Novels.*
7. *Essays.*
8. *Reviews.*
9. *Orations.*
   1. Kinds.
      1. Deliberative.
      2. Judicial.
      3. Demonstrative.
      4. Lectures.
      5. Sermons.
   2. Qualities.
   3. Parts.
      1. Exordium.
      2. Discussion.
      3. Peroration.

II. POETRY.
1. *The purpose.*
2. *The kinds.*
   1. Lyric.
      1. Songs.
      2. Odes.
      3. Elegies.
      4. Sonnets.
   2. Epic.

- II. Poetry.
  - 2. *The kinds.*
    - 3. Dramatic.
      1. Tragedies.
      2. Comedies.
    - 4. Didactic.
      1. Philosophical.
      2. Moral.
      3. Meditative.
      4. Satires.
- III. Versification.
  - 1. *Feet.*
    1. Spondee.
    2. Iambic.
    3. Trochee.
    4. Dactyl.
    5. Anapest.
    6. Amphiambus.
  - 2. *Verse.*
    1. Monometer.
    2. Dimeter.
    3. Trimeter.
    4. Tetrameter.
    5. Pentameter.
    6. Hexameter.
    7. Heroic.
    8. Blank verse.
    9. Rhyme.
      1. Illiterative.
      2. Assonatal.
      3. Consonatal.
      4. Triple.
      5. Middle.
  - 3. *Stanzas.*
    1. Distich.
    2. Triplet.
    3. Quatrain.
    4. Rhyme-Royal.
    5. Ottava Rima.
    6. Terza Rima.
    7. Sonnet Stanza.

SECTION VI.

LOGIC.

CHAPTER I.—OF TERMS.

- I. Conceptions.
  1. Their formation.
  2. Their object.
  3. Their relation.
- II. Substance and properties.
  1. *Sphere.*
  2. *Matter.*
  3. *Essentia.*
  4. *Genus.*
     1. General.
     2. Collective.
  5. *Differentia.*
  6. *Species.*
  7. *Individual.*
  8. *Accidental.*
     1. Logical.
     2. Continuous.
     3. Discrete.
- III. Of the whole and its parts.
  1. *Quantity.*
  2. *Division.*
     1. Physical.
     2. Mathematical.
     3. Logical.
        1. Co-ordinate.
        2. Disparate.
        3. Absolute.
        4. Relative.
- IV. Cause and effect.
  1. *Cause.*
     1. Absolute cause.
     2. Relative cause.
     3. Primary.
     4. Secondary.
     5. Efficient.
     6. Occasional.
     7. Material.
     8. Formal.
     9. Final.
     10. Negative.
     11. Transient.
     12. Permanent.
     13. Immanent.
  2. *Effect.*
     1. Immediate.
     2. Remote.
     3. Direct.
     4. Accidental.
- V. Difference and resemblance.
  1. Similarity.
  2. Contrariety.
  3. Analogy.

CHAPTER II.—PROPOSITIONS.

- I. JUDGMENT.
  - 1. *Scope of judgment.*
  - 2. *Kinds of judgment.*
    1. Categorical.
    2. Conditional.
    3. Disjunctive.
    4. Relative.
    5. Hypothetical.
    6. Probable.
- II. TERMS OF A PROPOSITION.
  1. Subject.
  2. Predicate.
- III. COPULA.
  1. Forms.
  2. Effects.
  3. Classification.
- IV. COMPLETENESS OF PROPOSITIONS.
- V. QUANTITY OF JUDGMENT.
  1. Comprehensive.
  2. Intensive.
  3. Portensive.
- VI. QUALITY OF JUDGMENT.
  1. Affirmative.
  2. Negative.
- VII. MODALITY OF JUDGMENT.
  1. Problematical.
  2. Assertive.
  3. Apodictical.
- VIII. CARDINAL PROPOSITIONS.
  1. Universal affirmatives.
  2. Universal negatives.
  3. Particular affirmatives.
  4. Particular negatives.
- IX. DISTRIBUTION OF TERMS.
  1. Universal propositions; subject.
  2. Negative propositions; predicate.
- X. IMMEDIATE INFERENCE.
  1. *Opposition of judgment.*
     1. Contraries.
     2. Sub-contraries.
  2. *Contra-position.*
     1. Extra-position.
     2. Contra-position.
  3. *Conversion.*
     1. Simple.
     2. Accidents.
  4. *Substitution of terms.*
- XI. COMPLEX PROPOSITIONS.
  1. Expletives.
  2. Differential.
  3. Exclusive.
  4. Conditional.
- XII. COMPOUND PROPOSITIONS.
  1. *Express.*
     1. Copulative.
     2. Causal.
     3. Discretive.
     4. Conditional.
  2. *Implied.*
     1. Exceptive.
     2. Exclusive.
- XIII. COMPARATIVE JUDGMENT.
  1. Simple comparatives.
  2. Comparatives of intensity.
  3. Comparatives of relation.
- XIV. PROBABLE JUDGMENT.
  1. Favorable.
  2. Unfavorable.
  3. Antecedent.

XV. Conditional judgment.
1. Sequence.
2. Complex condition.
3. Compound condition.

XVI. Disjunctive. Middle excluded.

XVII. Affirmation.
1. Identity.
2. Contradiction.
3. Cause or reason.
4. Middle excluded.

CHAPTER III.—SYLLOGISMS.

I. Classification.
1. *Categorical.*
2. *Conditional.*
3. *Disjunctive.*
1. Major premises.
2. Minor premises.
3. Conclusion.

II. Pure categorical.
1. Of figures.
2. Of mood.

III. Indirect conclusion.

IV. Conversion of syllogisms.
1. Ostensive reduction.
2. Contra position.

V. Complex syllogisms.

VI. Compound syllogisms.

VII. Incomplete forms.
1. Inductive.
2. Cumulative.

VIII. Redundant syllogisms.
1. Pro-syllogisms.
2. Epi-syllogisms.

IX. Compound judgment in syllogisms.

X. Comparative syllogisms.
1. Simple comparatives.
2. Intensity as a cause.
3. Of manner, time, and place.

XI. Probable syllogisms.
1. The sum of all the parts is the whole.
2. The remainder, with the part taken from the whole, is a whole.

XII. Conditional syllogisms.
XIII. Disjunctive syllogisms.
1. Divisives.
2. Comprehensives.
3. Dilemma.

CHAPTER IV.—FALLACIES.

I. In form.
II. In matter.
III. In diction.
1. Equivocation.
2. Amphibolæ.
3. Composition.
4. Division.
5. Figures of speech.

IV. Extra logical.
V. Of composition.
VI. Of accidents.
1. Ignoratio.
2. Elenchi.
3. Petitio.
4. Principii.

CHAPTER V.—METHODS.

I. Order an element in method.
II. Ideas in method.
1. Pleasure.
2. Utility.
3. Good.
4. Beautiful.
5. True.

III. The matter of method.
1. Analytic judgment.
2. Synthetic judgment.
3. Necessary matter.
4. Contingent matter.
5. Conjecture.
6. Hypothesis.

IV. Methods of investigation.
1. By observation.
2. By measurement.
3. By calculation.
1. Whole to parts.
2. Parts to whole.

V. Average and exclusion.

VI. Analysis.
1. Logical.
2. Physical.

VII. Induction and analogy.
1. Formal to find modal.
2. Modal to find formal.
3. Phenomenon to find class.

VIII. Elimination.
1. No two simple causes produce the same effect, and vice-versa.
2. Removal of cause, removes effect.
3. Magnitude of effect, varies with magnitude of cause.
4. The same cause always produces the same effect.
5. Laws of elimination.
1. Eliminate any element in complex antecedent, its consequent will disappear also.
2. If there is a regular disagreement in several antecedents in all the elements but one, that one is considered as the cause of any unvarying element in the consequents of the diverse antecedents.
3. Diminish the cause or increase it, and the effect will also be increased or diminished.
4. Remove one phenomenon, and if the others disappear, the one removed was the cause, but if the others remain, it was the effect.

IX. Methods of proof.
1. By demonstration.
2. By deduction.
3. By principles of interpretation.
4. Appeal to facts.
1. By induction.
2. Concurrence.
5. By progressive approach.

X. Refutation.
1. Direct refutation.
2. Indirect refutation.
3. Personal refutation.

SECTION VII.

UNITED STATES HISTORY.

CHAPTER I.—EARLY HISTORY.

- I. Discoveries.
  - 1. *By Columbus.*
    1. His early life (born 1436).
    2. His seeking aid.
    3. His outfit.
    4. Incidents of his voyage.
    5. The landing.
    6. Return.
    7. Subsequent voyages.
    8. Date of discovery (1492).
    9. His death (May 20, 1506).
    10. His burial, first, Seville; then, San Domingo; and last, in 1796, Havana, Cuba.
  - 2. *By Cabot.*
    1. Description of voyage.
    2. Places explored (1494).
    3. Date of discovery (1497).
  - 3. *By Vespucci.*
    1. His voyage.
    2. His description of the country.
    3. Name and date (1499).
- II. Explorations.
  - 1. *By the Spanish.*
    1. Ponce de Leon (1512).
    2. Balboa (1513).
    3. Cordova (1517).
    4. Grijalva (1518).
    5. Cortez (1519).
    6. Ayllon (1520).
    7. Magellan (1520).
    8. Narvaez (1528).
    9. De Soto (1539).
    10. Melendez (1565).
    11. Espejo (1582).
    12. Result of these.
  - 2. *By the French.*
    1. Denys (1506).
    2. Verrazzani (1524).
    3. Cartier (1534).
    4. Coligny (1562).
    5. De Gourgues (1567).
    6. De Monts (1604).
    7. Champlain (1608).
    8. Jesuit missionaries (1634). (1660).
    9. Result of these (1668).

- II. Explorations.
  - 3. *By the English.*
    1. Frobisher (1576).
    2. Sir Francis Drake (1579).
    3. Humphrey Gilbert (1583).
    4. Walter Raleigh (1584). (1585).
    5. Bartholomew Gosnold (1602).
    6. London Co. (1606).
    7. Plymouth Co. (1606).
    8. Result of these.
  - 4. *By the Dutch.*
    1. Henry Hudson (1609).
    2. The result.
- III. Early Settlements.
  - 1. *By the Spanish.*
    1. West Indies.
    2. Isthmus of Panama (1510).
    3. Mexico (1521).
    4. St. Augustine (1565).
    5. Santa Fe (1582).
    6. San Diego (1769).
  - 2. *By the French.*
    1. Quebec (1541).
    2. South Carolina (1562).
    3. Florida (1564).
    4. Acadia (1605).
    5. Canada (1608).
  - 3. *By the English.*
    1. Newfoundland (1583).
    2. Roanoke Island (1584–85).
    3. Virginia (1607).
  - 4. *By the Dutch.*

IV. Development of the Colonies:

- I. Virginia.
  1. *When?* (1607).
  2. *Where?* (Jamestown).
  3. *By whom?* (English).
  4. *Important events.*
     - 1. Domestic.
       1. Introduction of tobacco (1616).
       2. Introduction of slaves (1620).
       3. Marriage of Pocahontas (1613).
     - 2. Foreign.
       1. Navigation Act (1660).
  5. *Starving time* (1610).
  6. *Character of people.*
  7. *Progress in.*
     1. Population.
     2. Agriculture.
        1. Imports.
        2. Exports.
     3. Commerce.
     4. Manufactures.
     5. Education. William and Mary College.
     6. Science.
     7. Art.
     8. Invention.
  8. *Wars.*
     1. Bacon's Rebellion.
     2. 1st Indian War.

I. VIRGINIA.
- 8. *Wars.* 3. 2d Indian War.
  1. Cause.
  2. Time (1644).
  3. Battles.
  4. Length (2 years).
  5. Commanders.
  6. Result.
  7. Treaty.
  8. Incidents.
- 9. *Government.*
  1. First charter.
  2. Second charter.
  3. Third charter (1612).
  4. First colonial assembly (1619).
  5. Written constitution (1621).
- 10. *Noted men.*
  1. John Smith.
  2. Captain Newport.
  3. Lord Delaware.
  4. John Rolf.

II. PLYMOUTH AND MASSACHUSETTS BAY COLONY.
- 1. *When?* (1620).
- 2. *Where?* (Plymouth).
- 3. *By whom?* (English).
- 4. *Their sufferings.*
- 5. *Important events.*
  1. Domestic.
     1. Religious persecutions.
     2. Banishment of Williams.
     3. Banishment of Ann Hutchison.
     4. Banishment of the Quakers.
     5. Salem Witchcraft (1692).
     6. Union of the colonies (1643).
  2. Foreign.
     1. Charter revoked by James II.
     2. New charter by William.
- 6. *Character of people.*
- 7. *Progress.*
  1. Agriculture.
  2. Commerce.
  3. Manufacture.
  4. Education (Harvard College).
  5. Science.
  6. Art.
  7. Invention.
  8. Population.
- 8. *Wars.* King Phillip's.
  1. Cause.
  2. Time (1675).
  3. Battles.
  4. Commanders.
  5. Result.
  6. Treaty.
  7. Incidents.
- 9. *Government.*
  1. Democracy.
  2. Charter.
  3. Legislature.
- 10. *Other settlements.*
  1. Salem.
  2. Dorchester.

II. Plymouth and Massachusetts Bay Colony.
- 10. *Other settlements.*
  - 3. Cambridge.
  - 4. Lynn.
  - 5. Roxbury.
- 11. *Noted men.*
  - 1. John Carver.
  - 2. William Bradford.
  - 3. John Endicot.
  - 4. John Winthrop.
  - 5. Sir Edmund Andros.
  - 6. Roger Williams.
  - 7. Rev. J. Harvard.

III. Connecticut.
- 1. *When?* (1633).
- 2. *Where?* (Windsor).
- 3. *By whom?* (Dutch).
- 4. *Three colonies.*
  - 1. Connecticut.
    - 1. Hartford.
    - 2. Windsor.
    - 3. Weathersfield.
  - 2. New Haven.
  - 3. Saybrook.
- 5. *Character of settlers.*
- 6. *Important events.*
  - 1. Domestic.
    - 1. Charter oak.
  - 2. Foreign.
    - 1. Granting of charter by Charles II.
    - 2. Annulling of charter by James II.
- 7. *Progress.*
  - 1. Agriculture.
  - 2. Commerce.
    - 1. Domestic.
    - 2. Foreign.
  - 3. Manufacturing.
  - 4. Education.
    - 1. Common schools.
    - 2. Colleges.
  - 5. Science.
  - 6. Art.
  - 7. Invention.
  - 8. Population.
- 8. *Wars.* Pequod.
  - 1. Cause.
  - 2. Time (1637).
  - 3. Battles.
  - 4. Commanders.
  - 5. Length.
  - 6. Result (extermination of Pequods).
  - 7. Treaty.
  - 8. Incidents.
- 9. *Government.*
- 10. *Noted men.*
  - 1. Rev. Thomas Hooker.
  - 2. Captain John Mason.
  - 3. Sir Edmund Andros.

IV. Rhode Island.
- 1. *When?* (1636).
- 2. *Where?* (Providence).
- 3. *By whom?* (Roger Williams).
- 4. *Character of people.*
- 5. *Important events.*
  - 1. Relation to Massachusetts.
  - 2. Settlement of dispute.
- 6. *Government.*
  - 1. Proprietary.
  - 2. Charter.
  - 3. Changes.
  - 4. Constitution.
  - 5. Assembly.

- IV. Rhode Island.
  - 7. *Progress.*
    - 1. Agriculture.
    - 2. Commerce.
      - 1. Exports.
      - 2. Imports.
    - 3. Education (Brown University).
    - 4. Science.
    - 5. Art.
    - 6. Invention.
    - 7. Manufacture.
    - 8. Population.
  - 8. *Noted persons.*
    - 1. Roger Williams.
    - 2. Ann Hutchison.
    - 3. Cotton Mather.
- V. New Hampshire.
  - 1. *When?* (1623).
  - 2. *Where?* (Dover).
  - 3. *By whom?*
  - 4. *Progress.*
    - 1. Agriculture.
    - 2. Commerce.
    - 3. Education.
    - 4. Science.
    - 5. Art.
    - 6. Invention.
    - 7. Population.
  - 5. *Character of settlers.*
  - 6. *Government.*
    - 1. Charter.
    - 2. Proprietary.
    - 3. Government of Maine.
    - 4. Assembly.
  - 7. *Important events.*
    - 1. Several proprietors.
    - 2. Royal province.
    - 3. Dispute between Me. and Mass.
  - 8. *Noted men.*
    - 1. Ferdinand De Gorges.
    - 2. Capt. John Mason.
    - 3. Sir Edmund Andros.
    - 4. Duke of Monmouth.
- VI. New York.
  - 1. *When?* (1614).
  - 2. *Where?* (Manhattan Island).
  - 3. *By whom?* (Dutch).
  - 4. *Government.*
    - 1. Proprietary.
    - 2. Charter.
    - 3. Assembly.
  - 5. *Character of people.*
  - 6. *Important events.*
    - 1. Capture by English.
    - 2. Restoration.
    - 3. Representation granted.
    - 4. Representation prohibited.
    - 5. Uprising of the people.
    - 6. Execution of Leisler and Melborne.
    - 7. Union of the Five Nations.
  - 7. *Progress.*
    - 1. Agriculture.
    - 2. Commerce.
      - 1. Exports.
      - 2. Imports.
    - 3. Manufacture.
    - 4. Education.
    - 5. Science.
    - 6. Art (printing).
    - 7. Invention.
    - 8. Population.
  - 8. *Noted men.*
    - 1. Wouter Van Twiller.
    - 2. Wm. Kieft.
    - 3. Peter Stuyvesant.
    - 4. Duke of York.
    - 5. Sir Edmund Andros.
    - 6. Col. Sloughter.

VII. NEW JERSEY.

1. *When?* (1664).
2. *Where?* (Elizabeth).
3. *By whom?* (English).
4. *Government.*
   1. Proprietary.
   2. Charter.
   3. Assembly.
   4. Constitution.
5. *Character of people.*
6. *Important events.*
   1. Division of colony.
   2. Wm. Penn manager of E. and W. Jersey.
   3. East Jersey sold to Penn.
   4. Union of colony.
   5. Separate governments.
7. *Progress.*
   1. Agriculture.
   2. Commerce.
      1. Exports.
      2. Imports.
   3. Population.
   4. Education (Nassau Hall College).
8. *Noted men.*
   1. Lord Berkeley.
   2. Sir Geo. Cartaret.
   3. Philip Cartaret.
   4. Wm. Penn.

VIII. PENNSYLVANIA.

1. *When?* (1682).
2. *Where?* (Philadelphia).
3. *By whom?* (William Penn).
4. *Character of people.*
5. *Government.*
   1. Proprietary.
   2. Charter.
   3. Assembly.
   4. Constitution.
6. *Important events.*
   1. Treaty with Indians.
   2. Penn's return to England.
   3. Dissensions.
   4. New charter.
   5. Penn's second visit to Pennsylvania.
   6. Mason and Dixon's line.
7. *Progress.*
   1. Agriculture.
   2. Commerce.
      1. Exports.
      2. Imports.
   3. Education.
   4. Science.
   5. Art (Newspapers).
   6. Invention.
   7. Population.
8. *Noted men.*
   1. William Penn.
   2. William Markham.
   3. Penn's sons.

IX. DELAWARE.

1. *When?* (1638).
2. *Where?* (Wilmington).
3. *By whom?* (Swedes).
4. *Character of people.*
5. *Progress.*
6. *Important events.*
7. *Government.*
   1. Proprietary.
   2. Charter.
   3. Assembly.

X. MARYLAND.

1. *When?* (1634).
2. *Where?* (St. Mary's).

X. MARYLAND.
- 3. *By whom?* (Lord Baltimore).
- 4. *Character of the people.*
- 5. *Government.*
  - 1. Proprietary.
  - 2. Charter.
  - 3. Assembly.
- 6. *Important events.*
  1. Clayborne's Rebellion.
  2. Toleration Act.
  3. Disfranchisement of Catholics.
  4. Civil War.
  5. Second Religious War.
  6. Made a Royal Province.
- 7. *Progress.*
  1. Agriculture.
     - 1. Exports.
     - 2. Imports.
  2. Commerce.
  3. Science.
  4. Art.
     - 1. Common schools.
     - 2. Public library.
     - 3. Colleges.
  5. Education.
  6. Invention.
  7. Population.
- 8. *Noted men.*
  1. Lord Baltimore.
  2. Leonard Calvert.
  3. Charles Calvert.

XI. NORTH CAROLINA.
1. *When?* (1650).
2. *Where?* (Albemarle).
3. *By whom?* (English).
4. *Government.*
5. *Character of people.*
   - 1. Proprietary.
   - 2. Charter.
   - 3. Grand model.
   - 4. Assembly.
6. *Important events.*
   1. Culpepper Revolt.
   2. Indian Massacre.
   3. Division of Colony.
7. *Progress.*
   1. Agriculture.
      - 1. Exports.
      - 2. Imports.
   2. Commerce.
   3. Education.
   4. Science.
   5. Art.
   6. Invention.
   7. Population.
8. *Noted men.*
   1. Lord Clarendon.
   2. William Sayle.
   3. Seth Sothel.

XII. SOUTH CAROLINA.
1. *When?* (1670).
2. *Where?* (Ashley River).
3. *By whom?* (English).
4. *Government.*
5. *Character of people.*
   - 1. Proprietary.
   - 2. Charter.
   - 3. Assembly.
6. *Important events.*
   1. Introduction of slaves (1682).
   2. Rebellion.
   3. Cultivation of rice (1694).
   4. Expedition to St. Augustine.
   5. Expedition against Charleston.
   6. Indian War.
   7. Made a Royal Province.

XII. SOUTH CAROLINA.
- 7. *Progress.*
  - 1. Agriculture.
  - 2. Commerce.
    - 1. Exports.
    - 2. Imports.
  - 3. Education.
  - 4. Science.
  - 5. Art.
  - 6. Population.
- 8. *Noted men.*
  - 1. Governor Colleton.
  - 2. Sir John Yeamans.
  - 3. Governor Moore.
  - 4. Governor Craven.

XIII. GEORGIA.
- 1. *When?* (1733).
- 2. *Where?* (Savannah).
- 3. *By whom?* (Oglethorpe).
- 4. *Government.*
  - 1. Proprietary.
  - 2. Charter.
  - 3. Assembly.
  - 4. Change.
- 5. *Character of people.*
- 6. *Important events.*
  - 1. Invasion of Florida.
  - 2. Spanish Invasion.
  - 3. Oglethorpe's return to England.
- 7. *Progress.*
  - 1. Agriculture.
  - 2. Commerce.
    - 1. Exports.
    - 2. Imports.
  - 3. Education.
  - 4. Science.
  - 5. Art.
  - 6. Invention.
  - 7. Population.
- 8. *Noted men.*
  - 1. James Oglethorpe.
  - 2. Charles Wesley.
  - 3. John Wesley.

CHAPTER II.—DEVELOPMENT OF THE STATES.

I. WASHINGTON'S ADMINISTRATION.
- 1. *Time of election* (April 30, 1789).
- 2. *Politics* (none).
- 3. *Length of service* (Two terms).
- 4. *Important events.*
  - 1. Revenue.
  - 2. Public debt ($74,000,000).
  - 3. United States Bank (1791.)
  - 4. District of Columbia (1790).
  - 5. Admission of Vermont (1791).
  - 6. French Revolution.
  - 7. Whiskey Insurrection (1794).
  - 8. Spanish Boundaries (1795).
  - 9. Retirement (March 4, 1797).
- 5. *Noted men.*
  - 1. Thomas Jefferson (Secretary of State).
  - 2. Henry Knox (Secretary of War).
  - 3. Edmund Randolf (Attorney-General).
  - 4. Alexander Hamilton (Secretary of Treasury).

II. ADAMS' ADMINISTRATION.
1. *Time of election* (1796).
2. *Politics* (Federal).
3. *Length of term* (4 years).
4. *Important events.*
   1. Internal affairs.
   2. Alien and Sedition Laws (1798).
   3. French Hostilities.
   4. Reprisals (1798).
   5. Treaty with Bonaparte (1800).
   6. Death of Washington (Dec. 14, 1799, Age 68 years).

III. JEFFERSON'S ADMINISTRATION.
1. *Time of election* (March 4, 1801).
2. *Politics* (Republican).
3. *Length of term* (8 years).
4. *Important events.*
   1. Measures of Economy.
   2. Louisiana Purchase (In 1803, for $15,000,000).
   3. War with Tripoli (1801).
   4. Aaron Burr's duel (July, 1804).
   5. European Blockade (May, 1806).
   6. Right of Search.
   7. Firing upon the Chesapeake (June, 1807).
   8. Proclamation by President.
   9. British Trading Decree (Nov., 1807).
   10. Milan Decree (Nov., 1807).
   11. American Embargo (Dec., 1807).

IV. MADISON'S ADMINISTRATION.
1. *Time of election* (March 4, 1809).
2. *Politics* (Republican).
3. *Length of time* (8 years).
4. *Important events.*
   1. Non-intercourse Act (1809).
   2. Indian Outbreak (1811).
   3. Battle of Tippecanoe.
   4. War declared against England (June 19, 1812).
   5. Revocation of Milan Decree (1810).
   6. Charter of U. S. Bank (1816).
   7. War with Algiers.
   8. Treaty.

V. MONROE'S ADMINISTRATION.
1. *Time of election* (March 4, 1817).
2. *Politics* (Neutral).
3. *Length of service* (8 years).
4. *Important events.*
   1. Prosperity of the country.
   2. War with Seminoles (1817).
   3. Admission of Maine (1820).
   4. Missouri Compromise (1821).
   5. Monroe Doctrine (1822).
   6. Lafayette's Visit (1824).
   7. Purchase of Florida (In 1819 for $5,000,000).

VI. JOHN Q. ADAMS' ADMINISTRATION.
1. *Time of election* (March 4, 1825).
2. *Politics* Whig).

VI. JOHN Q. ADAMS' ADMINISTRATION.
3. *Length of service* (4 years).
4. *Important events.*
1. Prosperity of the country.
2. Death of Jefferson and Adams (July 4, 1826).
3. Protective tariff (1828).
4. First railroad.

VII. JACKSON'S ADMINISTRATION.
1. *Time of election* (March 4, 1829).
2. *Politics* (Democrat).
3. *Length of term* (8 years).
4. *Important events.*
1. Veto of U. S. Bank (1832 and 1836).
2. Black Hawk's War (1832).
3. Tariff Bill (1832).
4. Nullification Act (1832).
5. Clay's Compromise.
6. Florida War (1835).
7. Scott takes command (1836).
8. Victory by Col. Taylor (Dec., 1837).
9. Bank and Tariff question.

VIII. VAN BUREN'S ADMINISTRATION.
1. *Time of election* (March 4, 1837).
2. *Politics* (Democrat).
3. *Length of service* (4 years).
4. *Important events.*
1. Panic of 1837.
2. Canadian Rebellion (1837).
3. Ashburton Treaty (1842).
4. Sub-Treasury Bill (1840).

IX. HARRISON AND TYLER'S ADMINISTRATION.
1. *Time of election* (March 4, 1841).
2. *Politics* (Whig).
3. *Length of service* (4 years, 1 month).
4. *Important events.*
1. Death of Harrison (April 1).
2. Resignation of Cabinet.
3. United States Bank veto.
4. Dorr's Rebellion (1842).
5. Anti-rent Difficulties (1844).
6. The Mormans (1845).
7. Annexation of Texas (1845).
8. North-east Boundary.

X. POLK'S ADMINISTRATION.
1. *Time of election* (March, 1845).
2. *Politics* (Democrat).
3. *Length of term* (4 years).
4. *Important events.*
1. Mexican War (See *War*, July 4, 1845).
2. The Wilmot Proviso (1846).
3. Discovery of gold in California (1848).

XI. TAYLOR AND FILMORE'S ADMINISTRATION.
1. *Time of election* (March 4, 1849).
2. *Politics* (Whig).
3. *Length of term* (4 years; Taylor, 16 months).
4. *Important events.*
1. Slavery question.
2. Omnibus Bill (Sep., 1850).
3. The Admission of California (1850).
4. Death of Taylor (July 9, 1850).
5. Death of Clay and Webster (1852).
6. Invasion of Cuba.

XII. PIERCE'S ADMINISTRATION.
1. *Time of election* (March 4, 1853).
2. *Politics* (Democrat).
3. *Length of term* (4 years).
4. *Important events.*
   1. The Gadsden Purchase ($10,000,000)
   2. Kansas-Nebraska Bill (May, 1854).
   3. Border warfare.
   4. Perry's Expedition to Japan (1854).

XIII. BUCHANAN'S ADMINISTRATION.
1. *Time of election* (March 4, 1857).
2. *Politics* (Democrat).
3. *Length of service* (4 years).
4. *Important events.*
   1. Dred Scott Decision (1857).
   2. Fugitive Slave law.
   3. John Brown's Raid (1859).
   4. Secession of the South (Dec., 1860).
   5. Seizing of United States Forts, etc. (1860).

XIV. LINCOLN'S ADMINISTRATION.
1. *Time of election* (March 4, 1861).
2. *Politics* (Republican).
3. *Length of service* (4 years).
4. *Condition of country.*
5. *Great Civil War.* (See *War.*)
6. *Assassination* (April 14, 1865).

XV. JOHNSON'S ADMINISTRATION.
1. *Time of election* (April 15, 1865).
2. *Politics* (Republican).
3. *Length of term* (4 years).
4. *Important events.*
   1. Disbanding the army (1865).
   2. Reconstruction Policy.
   3. The 13th Amendment (Dec. 18, 1865).
   4. Public debt ($2,700,000,000, June, 1865).
   5. Reconstruction Policy of Congress (1867).
   6. Admission of Seceded States (June 24, 1868).
   7. Tenure of Office Bill (1867).
   8. Impeachment of the President (Jan. 24, 1868).
   9. The 14th Amendment (July 28, 1868).
   10. Indian War (1865–68).
   11. French in Mexico (1863).
   12. Laying Atlantic cable (1866).
   13. Purchase of Alaska ($7,200,000, March, 1867).
   14. Fenian excitement.
   15. Treaty with China (1868).

XVI. GRANT'S ADMINISTRATION.
1. *Time of election* (March 4, 1869).
2. *Politics* (Republican).
3. *Length of service* (8 years).
4. *Important events.*
   1. Pacific Railroad (1869). [1870].
   2. Fifteenth Amendment (March 30,

XVI. GRANT'S ADMINISTRATION.
- 4. *Important events.*
  - 3. Great Fires.
    - 1. Chicago. (Oct. 8, 1871.)
    - 2. Forest.
    - 3. Boston. (Nov. 9, 1872.)
  - 4. Treaty of Washington (Feb., 1871).
  - 5. Prospects of the country.
  - 6. Proposed annexation of Santo Domingo.
  - 7. Death of Greeley (Nov. 29, 1872).
  - 8. Modoc Indians (1873).
  - 9. Credit Mobilier.
  - 10. Railroad Panic (1873).
  - 11. Centennial Exhibition (May 10, 1876, for 6 months.)
  - 12. War with Sioux Indians (1877).
  - 13. The Virginius (1868).
  - 14. Joint Electoral Commission.
  - 15. Admission of Colorado (July 1, 1876).

XVII. HAYES' ADMINISTRATION.
1. *Time of election* (March 4, 1877).
2. *Politics* (Republican).
3. *Length of service* (4 years).
4. *Important events.*
   1. United States troops at the South withdrawn.
   2. Railroad strike (1877).
   3. Bland Silver Bill (Feb. 21, 1878).
   4. Fishery award ($5,500,000).
   5. Resumption of Specie payment (Jan. 1, 1879).

XVIII. GARFIELD'S ADMINISTRATION.
1. *Time of election* (March 4, 1881).
2. *Politics* (Republican).
3. *Length of service.*
4. *Assassination* (July 2, 1881).
5. *Death* (Sept. 19, 1881).

XIX. ARTHUR'S INAUGURATION (Sept. 20, 1881).

CHAPTER III.—MISCELLANEOUS EVENTS DURING THIS EPOCH.

I. PROGRESS. 1. *In States.*
1. Vermont (March 4, 1791).
2. Kentucky (June 1, 1792).
3. Tennessee (June 1, 1796).
4. Ohio (Nov. 29, 1802).
5. Louisiana (April 8, 1812).
6. Indiana (Dec. 11, 1816).
7. Mississippi (Dec. 10, 1817).
8. Illinois (Dec. 3, 1818).

I. PROGRESS.

1. *In States.*
   - 9. Alabama (Dec. 14, 1819).
   - 10. Maine (March 15, 1820).
   - 11. Missouri (August 10, 1821).
   - 12. Arkansas (June 15, 1836).
   - 13. Michigan (Jan. 26, 1837).
   - 14. Florida (March 3, 1845).
   - 15. Texas (Dec. 27, 1845).
   - 16. Iowa (Dec. 28, 1846).
   - 17. Wisconsin (May 29, 1848).
   - 18. California (Sep. 9, 1850).
   - 19. Minnesota (May 11, 1858).
   - 20. Oregon (Feb. 14, 1859).
   - 21. Kansas (Jan. 29, 1861).
   - 22. West Virginia (June 20, 1863).
   - 23. Nevada (Oct. 31, 1864).
   - 24. Nebraska (March 1, 1867).
   - 25. Colorado (July 1, 1876).

2. *In area.*
   1. Louisiana purchase (April 30, 1803, for $15,000,000).
   2. Spanish Florida (Feb. 22, 1819, for $5,000,000).
   3. Texas (1845).
   4. California (1848).
   5. Gadsden Purchase (1853. $10,000,000).
   6. Alaska (October, 1867, for $7,200,000).

3. *In population* (from 2,000,000 to 52,000,000).

4. *In production.*
5. *In agriculture.*
6. *In manufacture.*
7. *In commerce.*
8. *In invention.*
   1. Lightning rod (By Franklin, 1752).
   2. Cotton gin (By Whitney, 1792).
   3. Steamboat (By Fulton, Sept. 4, 1807).
   4. Railroad (1827 First, now 52,000 miles).
   5. Electro-magnetic telegraph (Morse, 1844).
   6. Atlantic Cable (Cyrus W. Field, 1857–58, 1866).
   7. Telephone (Bell, 1876–77).
   8. Varied machinery.

9. *Intellectually.*
   1. Common schools.
   2. High schools.
   3. Colleges.
   4. Newspapers.
   5. Books.

10. *Fine arts.*
    1. Painting.
    2. Sculpture.

11. *Morally.*
12. *In Governmental science.*
    1. Churches.
    2. Bible societies.
    3. Orphan asylums.
    4. Hospitals.

II. AUTHORS.

1. *Historians.*
   1. Bancroft.
   2. Prescott.
   3. Motley.
   4. Greeley.
   5. Forney.
   6. Headly.

II. AUTHORS.
- 1. *Historians.* — 7. Barnes. 8. Ridpath. 9. Lossing. 10. Anderson.
- 2. *Poets.* — 1. Bryant. 2. Whittier. 3. Simms. 4. Poe. 5. Holmes. 6. Longfellow.
- 3. *Romantic and miscellaneous.* — 1. Cooper. 2. Hawthorne. 3. Irving. 4. Channing. 5. Legare. 6. H. B. Stowe. 7. Mrs. Sigourney.

III. ORATORS.
1. *Webster.*
2. *Clay.*
3. *Calhoun.*
4. *Benton.*
5. *Everett.*
6. *Phillips.*
7. *Seward.*
8. *Prentice.*
9. *Stephens.*
10. *Douglass.*
11. *Choate.*
12. *Sumner.*

CHAPTER IV.—WARS OF UNITED STATES.

I. KING WILLIAM'S.
1. *Cause* (War between England and France on account of James II., King of England).
2. *Time* (1689).
3. *Length* (8 years).
4. *Battles.* — 1. Port Royal (1690). 2. Expedition against Quebec (1690). 3. Indian Expeditions (Schenectady, Haverhill).
5. *Result* (same as before). — 4. Commanders (Gov. Phipps). 5. Treaty (Ryswick, 1697.)

II. QUEEN ANNE'S
1. *Cause* (To place James' son on the Throne of England. France against England).
2. *Time* (1702).
3. *Length* (11 years).
4. *Battles.* — 1. Expedition against Port Royal (1707). 2. Second expedition against Port Royal (1710). 3. Invasion of Canada (1711).
5. *Result* (French gave up Acadia).
6. *Treaty* (Utrecht, 1713).

III. KING GEORGE'S.
1. *Cause* (Troubles in Europe).
2. *Time* (1744).
3. *Battle* (Capture of Louisburg, 1745).
4. *Length* (4 years).
5. *Result* (both parties restored territory taken).
6. *Treaty* (Aix-la-Chapelle, 1748).

IV. FRENCH AND INDIAN.
1. *Cause* (Overlapping Claims).
2. *Time* (1754).
3. *Washington's journey.*
4. *Objective points.* — 1. *Fort Du Quesne.* — 1. First Expedition (Surrender of Washington, July 4, 1754).

- IV. French and Indian.
  - 4. *Objective points.*
    - 1. *Fort Du Quesne.*
      - 2. Second Expedition (Defeat of Braddock, July 9, 1755).
      - 3. Result (Capture of the fort by General Forbes, 1758).
      - 4. Commanders.
        1. Braddock.
        2. Forbes.
        3. Washington.
    - 2. *Acadia and Louisburg.*
      1. Acadia (1755).
      2. Louisburg (1757).
      3. Commanders.
    - 3. *Crown Point and Ticonderoga.*
      1. Battle of Lake George (1755).
      2. Attack on Ticonderoga (1758).
      3. Capture of the Forts (1759).
      4. Commanders.
        1. Dieskau.
        2. Abercrombie.
      5. Result (Opened the route to Canada).
    - 4. *Niagara* (Captured in July, 1759).
    - 5. *Quebec.*
      1. Attack (Sept. 13, 1759).
      2. Commanders.
        1. Montcalm.
        2. Wolf.
      3. Result (Surrender of city, Sept. 18, 1759).
      4. Loss (Both commanders.)
  - 5. *Length* (9 years).
  - 6. *Close* (In 1760 for English, but French kept it up till 1763).
  - 7. *Treaty* (Of Paris, 1763).
  - 8. *Effects.*
    1. England gained all the possessions of the French North of Iberville River and East of Mississippi River.
    2. $16,000,000 loss, and—
    3. 30,000 men.
  - 9. *Incidents of the war.*
- V. Pontiac's War (1763).
- VI. War of Revolution.
  - 1. *Causes.*
    1. Writs of Assistance.
    2. Stamp Act (Passed 1765).
    3. Mutiny Act (1767).
    4. Boston Massacre (March 5, 1770).
    5. Boston Tea-party (Dec. 16, 1773).
  - 2. *Battles of 1775.*
    - 1. *Lexington.*
      1. When? (April 19, 1775).
      2. Number engaged.
      3. Commanders.
      4. Result (British defeat).
      5. Effects.
    - 2. *Bunker Hill.*
      1. When? (June 17, 1775).
      2. Commanders.

- VI. War of Revolution.
  - 2. *Battles of* 1775.
    - 2. *Bunker Hill.*
      - 3. Result (British defeat).
      - 4. Effect.
    - 3. *Capture of Ticonderoga.*
      - 1. When? (May 10, 1775).
      - 2. Commanders.
      - 3. Result (English defeat).
      - 4. Effect.
    - 4. *Canada expedition.*
      - 1. First column.
      - 2. Second column.
      - 3. Attack on Quebec (Dec. 31, 1775).
      - 4. Result (Patriot failure).
      - 5. Effects.
  - 3. *Battles of* 1776.
    - 1. *Evacuation of Boston* (March 17, 1776).
    - 2. *Attack on Ft. Moultrie.*
      - 1. The English fleet.
      - 2. Commanders.
      - 3. Result.
    - 3. *Campaign near New York* (July 12).
    - 4. *Battle of Long Island.*
      - 1. Time (August 27).
      - 2. Commanders.
      - 3. Result.
      - 4. Effect.
    - 5. *Washington's retreat.*
      - 1. To Harlem Heights.
      - 2. To White Plains.
      - 3. To North Castle.
      - 4. Flight through N. J.
      - 5. Condition of country.
    - 6. *Battle of Trenton.*
      - 1. Time (Dec. 25, 1776).
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effects.
  - 4. *Battles of* 1777.
    - 1. *Battle of Princeton.*
      - 1. Time (January 3, 1777).
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effect.
    - 2. *Battle of Germantown.*
      - 1. Time (Oct. 4, 1777).
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effect.
    - 3. *Battle of Brandywine.*
      - 1. Time (Sept. 11, 1777).
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effect.
    - 4. *Campaign at the North.*
    - 5. *Battle of Bennington.*
      - 1. Time.
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effect.

VI. WAR OF REVOLUTION.

- 4. *Battles of 1777.*
  - 6. *Burgoyne's Invasion.*
    1. Intent (June, 1777).
    2. Number of men (10,000).
    3. Crown Point.
    4. Ticonderoga.
    5. Fort Edwards.
  - 7. *Battles of Saratoga.*
    1. Time (Sept. 19; Oct. 7).
    2. Commanders.
    3. Number engaged.
    4. Result.
    5. Effects.
- 5. *Battles of 1778.*
  1. *Winter at Valley Forge* (1777–78).
  2. *Conway Cabal* (1778).
  3. *French Alliance* (Feb. 6, 1778).
  4. *Conciliatory proposals.*
  5. *America's friends.*
  6. *Evacuation of Philadelphia.*
  - 7. *Battle of Monmouth.*
    1. When? (June 28, 1778).
    2. Commanders.
    3. Number engaged.
    4. Result.
    5. Effect.
  - 8. *Campaign in Rhode Island.*
    1. French fleet.
    2. Result.
  9. *Massacre of Wyoming* (July, 1778).
- 6. *Battles, etc., of 1779.*
  - 1. *Campaign in the South.*
    1. Capture of Savannah (Dec. 29, 1778).
    2. Capture of Fort Sunbury (Jan., 1779).
    3. Battle of Kettle Creek (Feb., 1779).
    4. Battle of Brier Creek (March, 1779).
  - 2. *Campaign in the North.*
    1. Expedition into Connecticut.
    2. Expedition to Portsmouth.
    3. Capture of Stony Point.
    4. Second expedition to Connecticut.
    5. Recapture of Stony Point.
    6. Capture of Paulus Hook (July).
    7. Expedition against Fort Castine (July, 1779).
    8. Operations against the Indians.
  3. *Siege of Savannah* (September, 1779).
  4. *Squadron of Paul Jones* (September).

- VI. War of Revolution.
  - 7. *Battles, etc., of* 1780.
    - 1. *Campaign in the South.*
    - 2. *Battle of Camden.*
      - 1. When? (Aug. 16).
      - 2. Commanders.
      - 3. Number engaged.
      - 4. Result.
      - 5. Effect.
    - 3. *Position of Commanders.*
      - 1. Marion.
      - 2. Sumter.
      - 3. Pickens.
      - 4. Lee.
    - 4. *Arnold's treason.*
  - 8. *Battles, etc., of* 1781.
    - 1. *War in the South.*
    - 2. *Closing battles.*
      - 1. Guilford Court House (Mar. 15, 1781).
      - 2. Ninety-six (May).
      - 3. Eutaw Springs (September).
    - 3. *Green's retreat.*
    - 4. *In the North.*
      - 1. Arnold's Expedition into Virginia (Jan., 1781).
      - 2. Lafayette's defence.
      - 3. Cornwallis in Virginia (June).
    - 5. *Difficulties of the country.*
    - 6. *Siege of Yorktown.*
      - 1. Time (Oct. 19, 1781).
      - 2. Commanders.
      - 3. Number of men.
      - 4. Result.
      - 5. Effect.
    - 7. *Peace declared* (Nov. 30).
    - 8. *Treaty* (Sept. 3, 1783).
  - 9. *Miscellaneous.*
    - 1. *First Continental Congress.*
      - 1. When? (Sept. 5, 1774).
      - 2. Where? (Philadelphia).
      - 3. Result (Agreed upon a Declaration of Rights).
    - 2. *Second Continental Congress.*
      - 1. When? (May, 1775).
      - 2. Where? (Philadelphia).
      - 3. Result (Voted money and an army).
    - 3. *Stratagem of Fort Stanwix.*
    - 4. *Franklin's mission to France.*
    - 5. *Troubles in camp* (1780 and 1781).
    - 6. *Morris, Financial agent.*
    - 7. *Shay's Rebellion.*
    - 8. *Constitutional Convention* (May, 1787).
    - 9. *Adoption of Constitution* (Sept. 17, 1787).
    - 10. *Continental money.*
- VII. Second War with England.
  - I. Events of 1812.
    - 1. *Cause.*
      - 1. Right of Search.
      - 2. Impressment of our seamen.
      - 3. Seizing our vessels as prizes.

I. EVENTS OF 1812.
- 2. *Surrender of Detroit.*
  1. When? (Aug. 16, 1812).
  2. Commanders (Hull and Brock).
  3. Result (loss of Michigan).
- 3. *Battle of Queenstown.*
  1. When? (Oct. 13, 1812).
  2. Commanders (Van Rensselaer and Brock).
  3. Number of men.
  4. Result (Surrender of part of army).
- 4. *Naval victories.*
  1. Constitution and Guerriere (Aug. 9).
  2. Frolic and Wasp (Oct. 13).
  3. Other victories (300 prizes captured).

II. EVENTS OF 1813.
1. *The Northern Army.*
2. *The Central Army.*
3. *The Western Army.*
- 4. *Battle of the Thames.*
  1. When? (Oct. 5).
  2. Commanders (Proctor and Harrison).
  3. Result (Decided the war).
  4. Effect (Relieved Michigan).
5. *Perry's victory* (Sept. 10, 1813).
- 6. *Naval Battles.*
  1. Chesapeake and Shannon (June 1, 1813).
  2. Hornet and Peacock (Feb. 24).
7. *War with Creeks.*

III. EVENTS OF 1814.
- 1. *Battle of Lundy's Lane.*
  1. When? (July 25, 1814).
  2. Commanders (Brown and Drummond).
  3. Result (Not decisive).
- 2. *Battle of Lake Champlain.*
  1. When? (Sept. 11, 1814).
  2. Commanders (Prevost and Macomb).
  3. Result (Capture of British fleet).
3. *Ravages on Atlantic coast.*
- 4. *Battle of New Orleans.*
  1. When? (Jan. 8, 1815).
  2. Commanders (Jackson and Pakenham).
  3. Result (British defeat).
- 5. *Result of war.*
  1. In money ($127,000,000).
  2. Loss of men.
  3. Increase of manufacture.
6. *Peace declared.*
7. *Treaty* (Dec. 24, 1814, at Ghent; Ratified Feb. 17, 1815).

VIII. WAR WITH MEXICO.
1. *Cause.* Annexation of Texas (July 4, 1845).
- 2. *Campaign on Rio Grande.*
  1. When? (April 24, 1846).
  2. Commanders (Taylor and Arista).
  3. Number of men (2300 and 6000).
  4. Result (possession of Matamoras).
- 3. *Capture of Monterey.*
  1. When? (Sept. 24, 1846).
  2. Commanders (Taylor and Ampudia).
  3. Number of men (6000 and 10,000).
  4. Result (Capture of city).

- VIII. War with Mexico.
  - 4. *Battle of Beuna Vista.*
    1. When? (Feb. 23, 1847).
    2. Commanders (Taylor and Santa Anna).
    3. Number of men (Less than 5000 and 20,000).
    4. Result (Mexican defeat).
  - 5. *Conquest of New Mexico and Cal.*
    1. When? (June, 1846).
    2. Commanders (Kearney).
    3. Number of men (1000; vastly more).
    4. Result (Independence of California July 5, 1846).
  - 6. *Capture of Vera Cruz.*
    1. When? (March 29, 1847).
    2. Commanders (Scott and Santa Anna).
    3. Number of men (12,000; and more).
    4. Result (Capture of fortress and city).
  - 7. *Battle of Cerro Gordo.*
    1. When? (April 18, 1847).
    2. Commanders (Scott and Santa Anna).
    3. Number of men (12,000 and 12,000).
    4. Result (Mexican defeat).
  - 8. *Battles before Mexico.*
    1. When? (Aug. 7, 19, 20; Sept. 8, 1847).
    2. Commanders (Scott and Santa Anna).
    3. Number of men (10,000 and 30,000).
    4. Result (Occupancy of Mexico, Sept. 14, 1847).
  - 9. *Peace* (July 4, 1848).
  - 10. *Treaty* (Feb. 2, 1848, Guadaloupe Hidalgo).
  - 11. *Result.* Cession of New Mexico, Utah, and California to the United States by Mexico for $15,000,000).
- IX. War of Rebellion.
  - 1. *Cause.*
    1. Free trade.
    2. Slave labor.
    3. States Rights doctrine.
  - 2. *Events in 1861. East.*
    1. Surrender of Sumter (April 14, 1861).
    2. West Virginia Campaign (May 24, 1861).
    3. Big Bethel Repulse (June 10, 1861).
    4. Ball's Bluff (Oct. 21, 1861).
  - 3. *Events in 1861, West.*
    1. Battle of Carthage (June 17, 1861).
    2. Battle of Wilson's Creek (Aug. 10, 1861).
    3. Battle of Belmont (Nov. 7, 1861).
  - 4. *Events in 1862, East.*
    1. Movement of the army of the Peninsula (April 4).
    2. Capture of Yorktown (May 4).
    3. Battle of Williamsburg (May 5).
    4. Battle of Fair Oaks (May 31, June 1).
    5. Jackson's Raid (June 8).
    6. Seven Days' Retreat (June 28, 29, 30, July 1, 2, 3, 4).
    7. Battle of Gains' Mills (June 27).
    8. Invasion of the North (Sept. 5).

IX. WAR OF REBELLION.

4. *Events in 1862, East.*
   9. Battle of South Mountain (Sept. 14).
   10. Surrender of Harper's Ferry (Sept. 15).
   11. Battle of Antietam (Sept. 17).
   12. Battle of Fredericksburg (Dec. 13).
   13. Capture of New Orleans (April 28).

5. *Events in 1862, West.*
   1. Capture of Fort Henry (Feb. 6, 1862).
   2. Capture of Fort Donelson (Feb. 16).
   3. Occupation of Nashville (Feb. 23).
   4. Occupation of Columbus (March 12).
   5. Battle of Shiloh (April 6, 7; men, 40,000 and 57,000).
   6. Capture of Island No. 10 (April 7).
   7. Capture of Corinth (May 30).
   8. Invasion of Kentucky by Bragg (Aug.).
   9. His retreat and battle of Perryville (Oct. 8).
   10. Battle of Murfreesboro (Dec. 31 and Jan. 1).
   11. Battle of Iuka.
   12. Battle of Pea Ridge (March 7, 8).
   13. Battle of Memphis (June 6).

6. *Events in 1863, East.*
   1. Battle of Chancellorsville (May 2, 3).
   2. Invasion of Pennsylvania by Lee.
   3. Battles of Gettysburg.
      1. First day (July 1).
      2. Second day (July 2).
      3. Third day (July 3).
   4. Lee's retreat.
   5. Effect of these battles. Exploded the idea of northern invasion.

7. *Events in 1863, West.*
   1. Siege of Vicksburg (July 4).
   2. Surrender of Port Hudson (July 9).
   3. Rosenkrans in Tennessee (June).
   4. Battle of Chickamauga (Sept. 19, 20).
   5. Battle of Chattanooga (Nov. 23, 24, 25).
   6. Battle of Missionary Ridge (Nov. 25).
   7. Operations in East Tennessee (Nov. 30).

8. *Events in 1864, East.*
   8. Naval attack on Sumter (April 7).
   9. Capture of Fort Wagner (Sept. 7).
   1. Grant's Campaign (May 4).
   2. Battle of the Wilderness (May 5, 6).
   3. Battle of Spottsylvania (May 8, 9, 10, 11, 12).
   4. Battle of North Anna (June 3).
   5. Battle of Cold Harbor (June 3).
   6. Attack on Petersburg (June 8).
   7. Operations in Shenandoah Valley.
   8. Butler's Advance on Petersburg (June 18).
   9. The Mine Explosion (July 30).
   10. Siege of Washington (July 10).
   11. Battle of Monocacy (July 9).
   12. Sheridan's Valley Campaign (Sept.).

- IX. War of Rebellion.
  - 8. *Events in* 1864, *East.*
    - 13. Battle of Winchester (Sept. 19).
    - 14. Battle of Cedar Creek (Oct. 19).
  - 9. *Events in* 1864, *West.*
    1. Sherman's Campaign (May 6).
    2. Battles of Resaca and Dallas (May 14, 15, 25–28).
    3. Battles of Kenesaw Mountain (June 22).
    4. Hood's Attack at Atlanta (July 20, 22, 28).
    5. His Western movement.
    6. Battle of Franklin (Nov. 30).
    7. Battle of Nashville (Dec. 15, 16).
    8. Sherman's March to the Sea.
    9. Capture of Fort M'Allister (Dec. 13).
    10. Capture of Savannah (Dec. 24).
    11. Battle of Olustee (Feb. 20).
    12. Fort Pillow Massacre (April 12).
    13. Red River Expedition (March and April).
    14. Expedition against Mobile (Aug. 5).
    15. Expedition against Fort Fisher (Dec. 24, 25).
  - 10. *Events in* 1865, *South.*
    1. Northward march of Sherman (Feb.).
    2. Capture of Columbus (Feb. 17).
    3. Fall of Charleston (Feb. 18).
    4. Battle of Averysboro (Mar. 15).
    5. Battle of Goldsboro (Mar. 23).
  - 11. *Events in* 1865, *East.*
    1. Sheridan in the Shenandoah (May).
    2. Attack on Fort Steadman (Feb. 25).
    3. Battle of Five Forks (April 1).
    4. Attack on Petersburg (April 2).
    5. Petersburg and Richmond Falls (April 2, 3).
    6. Retreat of Lee (April 3 to 9).
    7. Surrender of Lee's Army (April 9).
    8. Surrender of Johnston (April 26).

- IX. War of Rebellion (Miscellaneous).
  - 1. *Result.*
    1. Abolition of Slavery (1865).
    2. Entire freedom of Country.
    3. Settlement of State Rights question.
  - 2. *Incidents connected with the war.*
    1. Emancipation Proclamation (Jan. 1, 1863.)
    2. Death of Lincoln (April 14, 1865).
    3. His Funeral (April 19, 1865).
    4. Attempt on the life of Seward (April 14, 1865).
    5. Execution of Conspirators.
    6. Death of Wilkes Booth.

IX. War of Rebellion (Miscellaneous).

2. *Incidents connected with the war.*

7. Proclamation of Neutrality by England and France (May 13, 1861).
8. McClellan superseded by Burnside (Nov., 1862).
9. Draft Riot (July 13–16, 1863).
10. Christian Commission.
11. The Trent Affair (Nov. 8. 1861).
12. Sanitary Commission.
13. Merrimac and Monitor (March 8, 1862).
14. Resignation of Scott (July, 1861).
15. Sioux War (1862).
16. Alabama and Kearsarge (July 19, 1864).
17. Paper Money ($2.80 in 1864).
18. Capture of Davis (May 11, 1865).

3. *Result of war.*

1. In Money ($2,749,000,000).
2. In Men.
   1. Killed 300,000.
   2. Crippled for life 200,000.
   3. Confederates 500,000.
3. In Destruction of property.

SECTION VIII.

GEOGRAPHY.

CHAPTER I.—MATHEMATICAL.

- I. MATHEMATICAL.
  - 1. *Terms.*
    - 1. Sphere.
    - 2. Hemisphere.
    - 3. Diameter.
    - 4. Circumference.
      - 1. Degrees.
      - 2. Minutes.
      - 3. Seconds.
    - 5. Circle.
  - 2. *Shape and size of earth.*
    - 1. General shape.
      - 1. By appearance of ships.
      - 2. Shadow in Eclipse.
      - 3. Circumnavigation.
    - 2. Proofs of rotundity.
    - 3. Oblate Spheroid.
      - 1. Longest Diameter.
      - 2. Shortest Diameter.
    - 4. Extent of Circumference.
    - 5. Extent of Diameter.
    - 6. Axis.
    - 7. Poles.
      - 1. North Pole.
      - 2. South Pole.
  - 3. *Circles of situation.*
    - 1. Their use.
      - 1. North Hemisphere.
      - 2. South Hemisphere.
    - 2. Their names.
      - 1. Equator.
      - 2. Parallels.
      - 3. Meridians.
    - 3. Latitude.
      - 1. North.
      - 2. South.
      - 3. How reckoned.
      - 4. Length of Degree.
    - 4. Longitude.
      - 1. Prime Meridian.
      - 2. East Longitude.
      - 3. West Longitude.
      - 4. Length of Degree.
  - 4. *Motions of earth.*
    - 1. Rotation.
      - 1. On what?
      - 2. In what time?
      - 3. Result.
    - 2. Revolution.
      - 1. Around what?
      - 2. In what time?
      - 3. Result.

- I. Mathematical.
  - 5. *Climate circles.*
    - 1. Tropics.
      - 1. Of Cancer.
      - 2. Of Capricorn.
    - 2. Polar Circles.
      - 1. Arctic Circle.
      - 2. Antarctic Circle.
  - 6. *Torrid Zone.*
    - 1. Situation.
    - 2. Characteristics.
  - 7. *Temperate.*
    - 1. Situation.
    - 2. Characteristics.
  - 8. *Frigid.*
    - 1. Situation.
    - 2. Characteristics.

CHAPTER II.—PHYSICAL.

- I. Land.
  - 1. *Extent.*
    - 1. Continents.
    - 2. Islands.
  - 2. *Contour forms.*
    - 1. Peninsulas.
    - 2. Capes.
    - 3. Isthmuses.
  - 3. *Relief forms.*
    - 1. Low lands.
      - 1. Plains.
        - 1. Desert.
        - 2. Forest.
        - 3. Prairies.
      - 2. Valleys.
    - 2. High lands.
      - 1. Plateaus.
        - 1. Desert.
        - 2. Fertile.
      - 2. Mountains.
        - 1. Chains.
        - 2. Ranges.
        - 3. Systems.
- II. Water.
  - 1. *The Ocean.* (With their subdivisions.)
    - 1. Atlantic.
    - 2. Pacific.
    - 3. Indian.
    - 4. Northern.
    - 5. Southern.
    - 1. Seas.
    - 2. Gulfs.
    - 3. Bays.
    - 4. Straits.
      - 1. Channels.
      - 2. Sounds.
  - 2. *Rivers.*
    - 1. Main Streams.
    - 2. Tributaries.
    - 3. Source.
    - 4. Mouth.
    - 5. Delta.
  - 3. *Lakes.*
    - 1. Salt.
    - 2. Fresh.
- III. Climate.
  - 1. *General Law.*
  - 2. *First Modification.* Altitude.
  - 3. *Second Modification.*
    - 1. Prevailing winds.
    - 2. Currents of air.
  - 4. *Third Modification.*
    - 1. Situation.
    - 2. Sea winds.
  - 5. *Fourth Modification.* Length of days.
- IV. Plants.
  - 1. *Tropical.*
    - 1. Bread Fruit.
    - 2. Bananas.
    - 3. Palms.
    - 4. Rice.

- IV. Plants.
  - 1. *Tropical.*
    - 5. Pine Apples.
    - 6. Caoutchouc, etc.
  - 2. *Warm Temperate.*
    - 1. Tea.
    - 2. Coffee.
    - 3. Rice.
    - 4. Wheat.
    - 5. Corn.
    - 6. Potatoes.
    - 7. Sweet Potatoes.
  - 3. *Cold Temperate.*
    - 1. Barley.
    - 2. Rye.
    - 3. Oats.
    - 4. Buckwheat.
    - 5. Potatoes.
  - 4. *Arctic.*
    - 1. Barley.
    - 2. Turnips.
    - 3. Dwarf Birches.
    - 4. Alder.
    - 5. Willows.
- V. Animals.
  - 1. *Temperate.*
    - 1. Domestic.
      - 1. Horse.
      - 2. Sheep.
      - 3. Camel.
      - 4. Ox.
      - 5. Goat.
      - 6. Hen.
      - 7. Geese.
      - 8. Ducks, etc.
    - 2. Wild.
      - 1. Buffalo.
      - 2. Deer.
      - 3. Wolf.
      - 4. Jay.
      - 5. Hawk etc.
  - 2. *Tropical.*
    - 1. Lion.
    - 2. Tiger.
    - 3. Hippopotamus.
    - 4. Peacocks.
    - 5. Ostriches, etc.
  - 3. *Arctic.*
    - 1. White Bear.
    - 2. Seal.
    - 3. Walrus.
    - 4. Reindeer.
    - 5. Fur-bearing Animals.

CHAPTER III.—POLITICAL.

- I. Races of Man.
  - 1. *Caucasian.*
    - 1. Physical characteristics.
      - 1. Features.
      - 2. Color.
      - 3. Hair.
      - 4. Beard.
    - 2. Representative type.
      - 1. Europeans.
      - 2. Arabs.
      - 3. Hindoos.
    - 3. Numbers.—600,000,000.

- I. RACES OF MAN.
  - 2. *Mongolian.*
    - 1. Physical characteristics.
      - 1. Features.
      - 2. Color.
      - 3. Hair.
      - 4. Beard.
    - 2. Representative type.
      - 1. Chinese.
      - 2. Japanese.
      - 3. Turks.
    - 3. Numbers.—589,000,000.
  - 3. *African.*
    - 1. Physical characteristics.
      - 1. Features.
      - 2. Color.
      - 3. Hair.
      - 4. Beard.
    - 2. Representative type.
      - 1. Tribes of Africa.
      - 2. Negroes in America.
    - 3. Number.—185,000,000.
  - 4. *Malay.*
    - 1. Physical characteristics.
      - 1. Features.
      - 2. Color.
      - 3. Hair.
      - 4. Beard.
    - 2. Representative type.
      - 1. Inhabitants of Malacca.
      - 2. East India Islanders.
      - 3. Pacific Islanders.
    - 3. Numbers.—60,000,000.
  - 5. *American.*
    - 1. Physical characteristics.
      - 1. Features.
      - 2. Color.
      - 3. Hair.
      - 4. Beard.
    - 2. Representative type.
      - Indians of North and South America.
    - 3. Numbers.—11,000,000.
- II. PHYSICAL NEEDS OF MAN.
  - 1. FOOD.
    - 1. *Animal.*
      - 1. Beasts.
        - 1. Domestic.
        - 2. Wild game.
          - 1. Forest.
          - 2. Prairie.
      - 2. Birds.
        - 1. Domestic.
        - 2. Wild game.
          - 1. Forest.
          - 2. Prairie.
      - 3. Fishes.
        - 1. Sea.
        - 2. Lake.
        - 3. River.
    - 2. *Vegetable.*
      - 1. Roots.
        - 1. Potatoes.
        - 2. Onions.
        - 3. Beets.
        - 4. Turnips.
      - 2. Stalks and leaves.
        - 1. Sugar.
        - 2. Tea.
        - 3. Cabbage, etc.
      - 3. Grains.
        - 1. Wheat.
        - 2. Barley.
        - 3. Rye.
        - 4. Corn.
        - 5. Coffee, etc.
      - 4. Fruits.
        - 1. Apples.
        - 2. Peaches.
        - 3. Nuts.
        - 4. Melons.

- II. Physical needs of man.
  - 1. Food.
    - 3. *Mineral.*
      1. Salt.
      2. Water.
      3. Lime.
      4. Iron.
  - 2. Clothing.
    - 1. *Animal.*
      1. Wool.
      2. Fur.
      3. Ivory.
      4. Horns.
      5. Leather.
    - 2. *Vegetable.*
      1. Cotton.
      2. Linen.
      3. Gutta-percha.
    - 3. *Mineral.*
      1. Iron.
      2. Steel.
      3. Copper.
      4. Brass.
  - 3. Shelter.
    - 1. *Animal.*
      1. Skins.
      2. Woollens.
    - 2. *Vegetable.*
      1. Cotton.
      2. Linen.
    - 3. *Mineral.*
      1. Brick.
      2. Stone.
      3. Paints.
      4. Glass.
- III. Nations.
  - 1. *European.*
    - 1. Europe.
      1. England.
      2. Russia.
      3. France.
      4. Spain, etc.
    - 2. Asia.
      1. Turkey.
      2. Persia.
      3. Siberia, etc.
    - 3. Africa.
      1. Soudan.
      2. Zanguebar.
      3. Cape Colony, etc.
  - 2. *American.*
    - 1. North America.
      1. United States.
      2. Mexico.
      3. Canada, etc.
    - 2. South America.
      1. Chili.
      2. Brazil.
      3. Peru, etc.
- IV. States of society.
  - 1. *Savage.*
    1. Characteristics.
    2. Language.—Spoken.
    3. Government.—Patriarchal.
    4. Religion.—Pagan.
  - 2. *Half civilized.*
    1. Characteristics.
    2. Language.
      1. Spoken.
      2. Written.
    3. Government.—Absolute Monarchy.
    4. Religion.—Buddhist.
  - 3. *Civilized.*
    1. Characteristics.
    2. Language.
      1. Spoken.
      2. Written.
    3. Government.
      1. Republican.
      2. Monarchical.
    4. Religion.—Christian.

- V. Occupations.
  - 1. *Agriculture.*
    - 1. Farming.
    - 2. Grazing.
  - 2. *Seafaring.*
    - 1. Fishing.
    - 2. Navigation.
  - 3. *Lumbering.*
    - 1. Cutting.
    - 2. Hauling.
    - 3. Sawing.
  - 4. *Mining.*
    - 1. Coal.
    - 2. Gold.
    - 3. Silver.
    - 4. Iron.
    - 5. Lead, etc.
  - 5. *Manufacturing.*
    - 1. For food.
      - 1. Flour.
      - 2. Syrup.
      - 3. Sugar, etc.
    - 2. For clothing.
    - 3. Shelter.
  - 6. *Commerce.*
    - 1. Foreign.
      - 1. Imports.
      - 2. Exports.
    - 2. Domestic.
      - 1. By rail.
      - 2. Canals.
      - 3. Rivers.
- VI. Government.
  - 1. *Republican.*
    - 1. Legislative.
      - 1. Senate.
      - 2. House of Representatives.
    - 2. Judicial.
      - 1. Supreme Court.
      - 2. Circuit Court.
      - 3. Inferior Court.
    - 3. Executive.
      - 1. President.
      - 2. Vice-President.
  - 2. *Monarchical.*
    - 1. Absolute.
    - 2. Limited.
    - 3. Kingdoms.
    - 4. Empires.
    - 5. Duchies.
- VII. Religion.
  - 1. *Christian.*
    - 1. Roman Catholic.
    - 2. Protestant.
    - 3. Greek Church.
  - 2. *Mohammedan.*
  - 3. *Jewish.*
  - 4. *Pagan.*

CHAPTER IV.—LOCAL OR STATE GEOGRAPHY.

- I. Position of state.
  - 1. *By Latitude and Longitude.*
  - 2. *By Boundaries.*
    - 1. Natural.
      - 1. Oceans.
      - 2. Lakes.
      - 3. Rivers.
    - 2. Artificial.—State lines.
- II. Outline.
  - 1. *Regular.*
  - 2. *Irregular.*
- III. Extent.
  - 1. *Definite size.*
    - 1. Length in miles.
    - 2. Breadth in miles.
    - 3. Area.
  - 2. *Comparative size.*—As to other States.

- IV. Coast.
  - 1. *Principal Indentations.*
    - 1. Gulfs.
    - 2. Bays.
  - 2. *Principal Projections.*
    - 1. Peninsulas.
    - 2. Capes.
  - 3. *Adjacent Islands.*
  - 4. *Harbor.*
- V. Surface.
  - 1. *Characteristics.*
    - 1. Level.
    - 2. Undulating.
    - 3. Mountains.
  - 2. *Mountains.*
    - 1. To what System.
    - 2. To what Range or Group.
  - 3. *Valleys.*
    - 3. Interior or Boundary.
  - 4. *Plains.*
    - 1. Wooded.
    - 2. Grassy.
    - 3. Sandy.
  - 5. *Direction of slopes.*
  - 6. *Natural Curiosities.*
- VI. Rivers.
  - 1. *To what System.*
  - 2. *Description of particular rivers.*
    - 1. Length.
    - 2. Navigable.
    - 3. For Waterpower.
    - 4. For Fish.
- VII. Lakes.
  - 1. *Description.*
  - 2. *To what System.*
  - 3. *Uses.*
    - 1. For Fishing.
    - 2. For Commerce.
- VIII. Climate.
  - 1. *As determined by Latitude.*
  - 2. *As modified by certain causes.*
    - 1. Altitude.
    - 2. Proximity to Sea.
    - 3. Great Lakes.
    - 4. Winds.
    - 5. Slope of Land.
    - 6. Nature of Soil.
    - 7. Forests.
- IX. Natural advantages.
  - 1. *On the surface.*
    - 1. Forests.
    - 2. The soil.
    - 3. Facilities for transportation.
  - 2. *Within the earth.*
    - 1. Useful minerals.
      - 1. Coal.
      - 2. Iron.
      - 3. Salt.
      - 4. Building stone.
      - 5. Copper, Lead, etc.
    - 2. Precious metals.
      - 1. Gold.
      - 2. Silver.
  - 3. *In the water.*
    - 1. Sea fish.
    - 2. Lake and River fish.
- X. Internal improvements.
  - 1. *Railroads.*
    - 1. Local roads.
    - 2. Trunk lines.
  - 2. *Canals.*
  - 3. *Navigation by Lakes and Rivers.*
- XI. Occupations.
  - 1. *Agriculture.*
    - 1. Crops raised.
    - 2. Stock raising.
  - 2. *Manufacturing.*
    - 1. Importance.
    - 2. Articles manufactured.
  - 3. *Mining.*
    - 1. Metals, etc., found.
    - 2. To what extent worked.

- XI. Occupations.
  - 4. *Lumbering.*
    - 1. Location of Forests.
    - 2. Method pursued.
  - 5. *Fishing.*
    - 1. Locality of fisheries.
    - 2. Kinds caught.
  - 6. *Commerce.*
    - 1. Exports.
    - 2. Imports.
    - 3. Means of transportation.
- XII. Government.
  - 1. *Legislative.*
    - 1. Names of Houses.
    - 2. Session.
    - 3. Length of term.
  - 2. *Executive.*
  - 3. *Judicial.*
    - 1. Supreme Court.
    - 2. Circuit Court.
- XIII. History.
  - 1. *Early History.*
    - 1. Colonial Period.
    - 2. Territorial Period.
    - 3. Date of Admission.
  - 2. *Subsequent growth and present Population.*
- XIV. Cities.
  - 1. *Capital.*
    - 1. Population.
    - 2. Industries.
    - 3. Chief source of wealth.
  - 2. *Metropolis.*
    - 1. Population.
    - 2. Industries.
    - 3. Chief source of wealth.
  - 3. *Other important Cities.*
    - 1. Population.
    - 2. Industries.
    - 3. Chief source of wealth

SECTION IX.

PHYSICAL GEOGRAPHY.

CHAPTER I.—GEOLOGY.

- I. General structure of the earth.
  - 1. *Earths.*
    - 1. Vegetable mould.
    - 2. Mineral earths.
      - 1. Silicious.
      - 2. Calcareous.
      - 3. Argillaceous.
  - 2. *Rocks.*
    - 1. Unstratified.
    - 2. Stratified.
    - 3. Fossiliferous.
      - 1. Stratified.
      - 2. Unstratified.
    - 4. Non-fossiliferous.
      - 1. Stratified.
      - 2. Unstratified.
    - 5. Igneous.
      - 1. Plutonic.
        - 1. Unstratified.
        - 2. Non-fossiliferous.
      - 2. Volcanic.
        - 1. Unstratified.
        - 2. Non-fossiliferous.
    - 6. Metamorphic.
      - 1. Stratified.
      - 2. Non-fossiliferous.
    - 7. Aqueous.
      - 1. Stratified.
      - 2. Fossiliferous.
- II. Continents.
  - 1. *Eastern.*
    - 1. Europe.
    - 2. Asia.
    - 3. Africa.
  - 2. *Western.*
    - 1. North America.
    - 2. South America.
- III. Islands.
  - 1. *Continental.*
    - 1. Japanese.
    - 2. British Islands.
    - 3. West Indies.
  - 2. *Pelagic.*
    - 1. Common.
      - 1. Sandwich.
      - 2. St. Helena.
    - 2. Volcanic.
      - 1. Sabrina.
      - 2. Nyoe.
      - 3. Hotham.
    - 3. Caroline.
      - 1. Lagoon.
      - 2. Encircling Reefs.
      - 3. Barrier Reefs.
      - 4. Infringing Reefs.
- IV. Mountains.
  - 1. 20,000 *feet and up.*
  - 2. 10,000 *to* 20,000.
  - 3. 2000 *to* 10,000.
  - 4. *Chains.*
  - 5. *Ranges.*
  - 6. *Systems.*

- V. Valleys.
  - 1. *Longitudinal.*
  - 2. *Transverse.*
- VI. Plateaus.
  - 1. *Desert.*
  - 2. *Fertile.*
- VII. Plains.
  - 1. *Wooded.*
    - 1. Forests.
    - 2. Selvas.
    - 3. Heaths.
  - 2. *Grassy.*
    - 1. Prairies.
    - 2. Llanos.
    - 3. Pampas.
    - 4. Steppes.
  - 3. *Desert.*
    - 1. Llanos.
    - 2. Steppes.
    - 3. Landes.
- VIII. Volcanoes.
  - 1. *Central System.*
    - 1. Active.
    - 2. Intermittent.
    - 3. Extinct.
  - 2. *Linear System.*
    - 1. Active.
    - 2. Intermittent.
    - 3. Extinct.
  - 3. *Mud Volcanoes.*
  - 4. *Fires of Bokou.*
  - 5. *Hochans.*
  - 6. *Hotsing.*
  - 7. *Geysers.*
- IX. Earthquakes.
  - 1. *Linear.*
    - 1. Horizontal.
    - 2. Vertical.
    - 3. Rotary.
  - 2. *Circular.*
    - 1. Horizontal.
    - 2. Vertical.
    - 3. Rotary.

CHAPTER II.—HYDROGRAPHY.

- I. Springs.
  - 1. *Perennial.*
  - 2. *Intermittent.*
  - 3. *Periodical.*
  - 4. *Salt.*
    - 1. Syracuse, N. Y.
    - 2. Kanawha, Va.
  - 5. *Mineral.*
    - 1. Saratoga, N. Y.
    - 2. Sulphur, Va.
    - 3. Blue Licks, Ky.
- II. Rivers.
  - 1. *Oceanic.*
    - 1. Arctic.
    - 2. Antarctic.
    - 3. Pacific.
    - 4. Atlantic.
    - 5. Indian.
  - 2. *Continental.*
  - 3. *Main Streams.*
  - 4. *Tributaries.*

- III. LAKES.
  1. *Those with inlet and no outlet.*
  2. *Those with inlet and an outlet.*
  3. *Those with no inlet but an outlet.*
  4. *Those with no inlet nor outlet.*
  5. *Salt.*
  6. *Fresh.*
- IV. OCEANS.
  1. *Arctic.*
  2. *Atlantic.*
     1. North Atlantic.
     2. South Atlantic.
     3. Eastern.
        1. Mediterranean Sea.
        2. Baltic Sea.
     4. Western.
        1. Caribbean Sea.
        2. Gulf of Mexico.
        3. Honduras Bay.
  3. *Pacific.*
     1. Eastern.
        1. Gulf of California.
        2. Sea of Kamtschatka.
     2. Western.
        1. China Sea.
        2. Yellow Sea.
        3. Japan Sea.
  4. *Indian.*
     1. Bay of Bengal.
     2. Persian Gulf.
     3. Arabian Sea.
     4. Red Sea.
  5. *Antarctic.*
- V. OCEANIC MOVEMENTS.
  1. *Waves.*
     1. By the onward flow of the ocean's surface.
     2. By the Winds.
     3. By the Earthquakes.
  2. *Tides.*
     1. Flood Tide.
        1. Spring Tide.
        2. Neap Tide.
     2. Ebb Tide.
        1. Spring Tide.
        2. Neap Tide.
  3. *Currents.*
     1. Under Currents.
     2. Counter Currents.
        1. Hurlgate, East River.
        2. Roost of Shumburg, South Shetland.
     3. Temporary Currents.
     4. Constant Currents.
        1. The Antarctic Current.
        2. The Equatorial Current of the Atlantic.
        3. The Equatorial Current of the Pacific.
        4. The Southern connecting Current.
        5. Guiana and Caribbean Current.
        6. Gulf Stream.
        7. North Africa and Guinea Current.
        8. Arctic Current.
        9. Japan Current.
        10. Saxgasso, or Grassy Sea.
     5. Periodical Currents.
        1. Red Sea.
        2. Persian Gulf.
        3. China Sea.
        4. Indian Ocean.

CHAPTER III.—METEOROLOGY.

- I. Atmosphere.
  - 1. *Dry air.*
    - 1. Oxygen, 20, or 21.
    - 2. Nitrogen, 79, or 80.
  - 2. *Vapor of water.*
- II. Temperature.
  - 1. *Temperature of a solid body.*
  - 2. *Temperature of the atmosphere.*
  - 3. *Temperature of a place.*
- III. Winds.
  - 1. *Constant or Trade.*
    - 1. North-east.
    - 2. South-east.
  - 2. *Periodical.*
    - 1. Land and sea breezes.
      - 1. From the sea.
      - 2. From the land.
    - 2. Monsoons.
      - 1. North-east.
      - 2. North-west.
      - 3. South-east.
      - 4. South-west.
    - 3. Etezian.
    - 4. Northers of Texas and Mexico.
  - 3. *Variable.*
    - 1. South-west.
    - 2. North-west.
  - 4. *Hot winds.*
    - 1. Simoom.
    - 2. Khamsin.
    - 3. Harmattan.
    - 4. Sirocco.
    - 5. Solano.
  - 5. *Cold winds.*
    - 1. Pamperos.
    - 2. Northers of Texas and Mexico.
    - 3. Bora.
  - 6. *Whirlwinds.*
    - 1. Hurricanes.
    - 2. Typhoons.
    - 3. Cyclones.
    - 4. Tornadoes.
  - 7. *Revolving winds.*
  - 8. *Moist winds.*
  - 9. *Dry winds.*
- IV. Moisture of the atmosphere.
  - 1. *Dew.*
  - 2. *Frosts.*
  - 3. *Fog.*
  - 4. *Clouds.*
    - 1. Cirrus.
    - 2. Cumulus.
    - 3. Stratus.
    - 4. Nimbus.
  - 5. *Rain.*
    - 1. Rainless region.
    - 2. Periodical rains.
    - 3. Frequent.
  - 6. *Snow.*
    - 1. Glaciers.
    - 2. Icebergs.
  - 7. *Hail.*
    - 3. Avalanches.
- V. Climate.
  - 1. *Elevation above the sea level.*
    - 1. Tierras Calientes.
    - 2. Tierras Templadas.
    - 3. Tierras Frias.
  - 2. *Slope of the land.*
  - 3. *Position of mountains and plains.*
  - 4. *Vicinity of the sea.*
  - 5. *The nature of the soil.*
  - 6. *Isothermal lines.*
    - 1. The torrid.
    - 2. The hot.
    - 3. The warm.
    - 4. The temperate.

- V. Climate.
  - 6. *Isothermal lines.*
    - 5. The cold.
    - 6. The frigid.
- VI. Electrical phenomena.
  - 1. *Electricity.*
    - 1. Thunder.
      - 1. Zigzag.
      - 2. Sheet.
      - 3. Globular.
    - 2. Lightning.
  - 2. *Mariners' light.*
  - 3. *Aurora Borealis.*
- VII. Optical Phenomena.
  - 1. *Rainbow.*
  - 2. *Halos coronæ.*
  - 3. *Mock suns.*
  - 4. *Mock moons.*
  - 5. *Mirage.*
  - 6. *Fata Morgana.*
  - 7. *Ignis Fatuus.*

CHAPTER IV.—ORGANIC LIFE.

- I. Botany.
  - 1. *Cryptogamous.*
  - 2. *Phænogamous.*
    - 1. Endogenous.
    - 2. Exogenous.
  - 3. *Hot Climate.*
  - 4. *Warm Temperate.*
  - 5. *Cold Temperate.*
  - 6. *Arctic.*
  - 7. *Food Plants.*
  - 8. *Clothing Plants.*
  - 9. *Narcotics.*
- II. Zoology.
  - 1. *Vertebrated.*
    - 1. *Mammalia.*
      - 1. Quadrumana.
      - 2. Carnivora.
        - 1. Chieroptera.
        - 2. Insectivora.
        - 3. Digitigrada.
          - 1. Dog.
          - 2. Cat.
        - 4. Plantigrada.
      - 3. Marsupialia.
      - 4. Rodentia.
      - 5. Edentata.
      - 6. Pachydermata.
      - 7. Ruminantia.
      - 8. Marine Mammalia.
        - 1. Amphibia.
        - 2. Cetacea.
    - 2. *Birds.*
      - 1. Rapaces.
      - 2. Scansores.
      - 3. Oscines.
      - 4. Galinacea.
      - 5. Grallatores.
      - 6. Natatores.
    - 3. *Fishes.*
      - 1. For food.
      - 2. Other species.
    - 4. *Reptiles.*
      - 1. Crocodiles.
      - 2. Serpents.
        - 1. Venomous.
        - 2. Harmless.
      - 3. Frogs.
      - 4. Turtles.
  - 2. *Molluscuous.*
  - 3. *Articulated.*
  - 4. *Radiated.*
- III. Ethnography.
  - 1. *Caucasian.*
    - 1. Europeans.
    - 2. Hindoos.
    - 3. Whites of America.

III. Ethnography.
- 2. *Mongolian.*
  - 1. Esquimaux.
  - 2. Chinese.
  - 3. Osmans of Turkey, etc.
- 3. *Ethiopian.*
  - 1. Abyssinians.
  - 2. Africans.
  - 3. New Caledonians.
- 4. *Malay.*
  - 1. Inhabitants of Malacca.
  - 2. New Zealanders, etc.
- 5. *American.*
  - 1. Indians of North America.
  - 2. Indians of South America.

CHAPTER V.—LOCAL PHYSICAL GEOGRAPHY.

I. Coast.
- 1. *Projections.*
  - 1. Peninsulas.
  - 2. Capes.
- 2. *Indentations.*
  - 1. Seas.
  - 2. Bays.
  - 3. Gulfs.
  - 4. Inlets.
  - 5. Sounds.

II. Islands.
1. *Continental.*
2. *Sea.*
3. *Lake.*
4. *River.*

III. Mountains.
1. *System.*
2. *Chain.*
3. *Range.*
4. *Boundary.*
5. *Interior.*
6. *Volcanoes.*

IV. Lakes.
1. *Salt.*
2. *Fresh.*
3. *To what system.*

V. Rivers.
1. *Oceanic.*
2. *Continental.*
3. *Main streams.*
4. *Tributaries.*
5. *Availability for navigation.*
6. *Availability for water-power.*

VI. General Surface.
1. *Level.*
2. *Undulating.*
3. *Mountainous.*
4. *Nature of soil for Agriculture.*
5. *Natural Curiosities.*

VII. Springs.
- 1. *Mineral.*
  - 1. *Salt.*
  - 2. *Sulphur.*
- 2. *Hot.*

VIII. Climate.
1. *Hot.*
2. *Temperate.*
3. *Cold.*

- IX. Rainfall.
  1. *Periodical.*
  2. *Frequent.*
  3. *Scanty.*
- X. Plants.
  1. *For food.*
     1. *Tropical.*
     2. *Temperate.*
     3. *Arctic.*
  2. *For clothing.*
  3. *Narcotics.*
- XI. Animals.
  1. *Domestic.*
  2. *Wild.*
- XII. Mineralogy.
  1. *Precious metals.*
  2. *Precious stones.*
  3. *Ordinary stones.*
     1. Marble.
     2. Granite.
     3. Sandstone.
  4. *Ordinary metals.*
     1. Iron.
     2. Copper.
     3. Lead.
     4. Tin, etc.
  5. *Ordinary minerals.*
     1. Coal.
        1. Anthracite.
        2. Bituminous.
     2. Salt.
        1. Springs.
        2. Mines.
  6. *Petroleum.*

SECTION X.

GEOLOGY.

CHAPTER I.—ROCKS.

- I. Stratified, or aqueous rocks.
  - 1. *Eozoic*
    1. Mica.
    2. Mica Schist.
    3. Saccharoid Limestone.
    4. Talcose Schist.
    5. Hornblende.
    6. Quartz Rock.
    7. Clay, or Argillaceous Slate.
    8. Serpentine Rocks.
  - 2. *Palæozoic.*
    1. Silurian Series.
    2. Devonian Series.
    3. Carboniferous Series.
    4. Permian Series.
  - 3. *Mesozoic.*
    1. Triassic Series.
    2. Jurassic Series.
    3. Cretaceous Series.
  - 4. *Cainozoic.*
    - 1. Tertiary.
      1. Eocene.
      2. Miocene.
      3. Pliocene.
    - 2. Drift.
      1. Moraine Terraces.
      2. Sub-aqueous Ridges.
      3. Sea Beaches.
      4. Sea Bottom.
    - 3. Alluvium.
      1. Soil.
      2. Clay.
      3. Sand.
      4. Peat.
      5. Marl.
      6. Calcareous Tufa.
      7. Coral Reefs.
      8. Deposits of skeletons of Infusoria.
- II. Unstratified, or igneous rocks.
  1. *Granitic Rocks.*
  2. *Trappean Rocks.*
  3. *Volcanic Rocks.*

CHAPTER II.—VOLCANOES AND EARTHQUAKES, ETC.

I. *Intermittent.*
II. *Phenomena of an eruption.*
III. *Dynamics of volcanic action.*
IV. *New islands formed by volcanic agency.*
V. *Submarine volcanoes.*
VI. *Character of molten lava.*
VII. *Volcanoes constantly active.*
VIII. *Seat of volcanic power.*
IX. *Extinct volcanoes.*

EARTHQUAKES.

I. CONCUSSIONS. { 1. *Horizontal.* 2. *Perpendicular.* 3. *Rotary.*
II. PROGRESSION. { 1. *Linear.* 2. *Circular.*

THERMAL SPRINGS.

I. *Theory of thermal springs.*
II. *The Geysers of Iceland.*
III. *The Hot Springs of Arkansas.*
IV. *The Hot Springs of Rocky Mountains.*

CHAPTER III.—FOSSIL REMAINS.

I. SILURIAN SERIES. { 1. *Polypi.* 2. *Brachiopods.* 3. *Crinoids.* 4. *Echinodermata.* 5. *Crustacea.* 6. *Corals.* 7. *Fishes.*
II. DEVONIAN SERIES. { 1. *Animals.* 2. *Fishes.* 3. *Reptiles.* 4. *Ferns.* 5. *Stigmaria.* 6. *Sigillaria.* 7. *Rhyncholites.*
III. PERMIAN SERIES.—Similar to above.
IV. TRIASSIC SERIES. { 1. *Plants.* 2. *Animals.* 3. *Reptiles.* 4. *Fishes.*

V. JURASSIC PERIOD.

1. *Animals.*
2. *Insects.*
3. *Fishes.*
4. *Ichthyosaurus.*
5. *Pleiosaurus.*
6. *Iguanodon.*
7. *Pterodactyl.*
8. *Foot-marks.*
9. *Raindrops.*
10. *Fossil sponges.*
11. *Corals.*
12. *Crustaceous shells.*
13. *Reptiles.*
14. *Fruits.*
15. *Nummulites.*

SECTION XI.

BOTANY.

CHAPTER I.—PHENOGAMOUS (FLOWERING PLANTS).

- I. EXOGENOUS.
  - 1. *Polypetalous.*
    - 1. *Stamens more than ten.*
      1. Mallow Family.
      2. Mimosa Family.
      3. Rue Family.
      4. Camellia Family.
      5. Magnolia Family.
      6. Water-lily Family.
      7. Calycanthus Family.
      8. Rose Family.
      9. Moonseed Family.
      10. Custard-apple Family.
      11. Crowfoot Family.
      12. Mignonette Family.
      13. Fig-marigold Family.
      14. Pulse Family.
      15. Barberry Family.
      16. Rock-rose Family.
      17. Caper Family.
      18. Poppy Family.
      19. Cactus Family.
      20. Loasa Family.
      21. Myrtle Family.
      22. Pitcher-plant Family.
      23. Sundew Family.
      24. Begonia Family.
      25. Purslane Family, etc.
    - 2. *Stamens less than ten.*
      1. Magnolia Family.
      2. Quassia Family.
      3. Orpine Family.
      4. Saxifrage Family.
      5. Soapberry Family.
      6. Leadwort Family.
      7. Primrose Family.
      8. Sterculia Family.
      9. Vine Family.
      10. Buckthorn Family.
      11. St. John's Wort Family.
      12. Fumitory Family.
      13. Mustard Family.
      14. Caper Family.

- I. Exogenous.
  - 1. *Polypetalous.*
    - 2. *Stamens less than ten.*
      - 15. Passion Flower Family.
      - 16. Violet Family.
      - 17. Sundew Family.
      - 18. Tamarisk Family.
      - 19. Pittosporum Family.
      - 20. Cashew Family.
      - 21. Pink Family.
      - 22. Water Wort Family.
      - 23. Flax Family.
      - 24. Parsley Family.
      - 25. Gourd Family.
  - 2. *Monopetalous.*
    - 1. *Superior Calyx and Inferior Ovary.*
      - 1. Composite Family.
      - 2. Lobelia Family
      - 3. Campanula Family.
      - 4. Whortleberry Family.
      - 5. Valerian Family.
      - 6. Honeysuckle Family.
      - 7. Gesneria Family.
      - 8. Storax Family.
      - 9. Cinchona Family.
      - 10. Madder Family.
      - 11. Teasel Family.
      - 12. Gourd Family.
    - 2. *Superior Ovary and Inferior Calyx.*
      - 1. Heath Family.
      - 2. Pulse Family.
      - 3. Polygala Family.
      - 4. Fumitory Family.
      - 5. Borage Family.
      - 6. Nightshade Family.
      - 7. Figwort Family.
      - 8. Bladderwort Family.
      - 9. Broom-rape Family.
      - 10. Gesneria Family.
      - 11. Bignonia Family.
      - 12. Sesamum Family.
      - 13. Acanthus Family.
      - 14. Vervain Family.
      - 15. Mint Family.
      - 16. Geranium Family.
      - 17. Orpine Family.
      - 18. Heath Family.
      - 19. Ebony Family.
      - 20. Storax Family.
      - 21. Leadwort Family.
      - 22. Primrose Family.
      - 23. Sapodilla Family.
      - 24. Nolana Family.
      - 25. Dogbane Family.
      - 26. Milkweed Family.
      - 27. Four-O'clock Family.
      - 28. Holly Family.
      - 29. Plantain Family.

- I. Exogenous.
  - 2. *Monopetalous.*
    - 2. *Superior Ovary and Inferior Calyx.*
      - 30. Logania Family.
      - 31. Waterleaf Family.
      - 32. Polemonium Family.
      - 33. Heliotrope Family.
      - 34. Convolvulus Family.
      - 35. Dodder Family.
      - 36. Olive Family.
  - 3. *Apetalous.*
    - 1. Flowers not in Catkins.
      - 1. Birthwort Family.
      - 2. Evening Primrose Family.
      - 3. Pink Family.
      - 4. Loosestrife Family.
      - 5. Witch-hazel Family.
      - 6. Saxifrage Family.
      - 7. Poppy Family.
      - 8. Amaranth Family.
      - 9. Chickweed Family.
      - 10. Oleaster Family.
      - 11. Laurel Family.
      - 12. Sweet-gale Family.
      - 13. Plane-tree Family.
      - 14. Fig Family.
      - 15. Elm Family.
      - 16. Mezereum Family.
      - 17. Sandalwood Family.
      - 18. Dogwood Family.
      - 19. Buckwheat Family.
      - 20. Crowfoot Family.
      - 21. Lizzard's-Tail Family.
      - 22. Hemp Family.
      - 23. Goosefoot Family.
      - 24. Water Milfoil Family.
      - 25. Spurge Family.
      - 26. Pokeweed Family.
      - 27. Buck-thorn Family.
    - 2. Flowers in Catkins or Catkin-like heads.
      - 1. Nettle Family.
      - 2. Pine Family.
      - 3. Fig Family.
      - 4. Mistletoe Family.
      - 5. Walnut Family.
      - 6. Birch Family.
      - 7. Willow Family.
      - 8. Plane-tree Family.
      - 9. Oak Family.
  - 4. *Gymnospermous.*
    - 1. Cycas.
    - 2. Pine.
- II. Endogenous.
  - 1. *Spadiceous.*
    - 1. Palm Family.
    - 2. Pondweed Family.
    - 3. Duckweed Family.
    - 4. Cat-tail Family.
    - 5. Arum Family.
  - 2. *Petaloideous.*
    - 1. Water-plantain Family.
    - 2. Yam Family.

- II. Endogenous.
  - 2. *Petaloideous.*
    3. Frog's-bit Family.
    4. Orchis Family.
    5. Ginger Family.
    6. Arrowroot Family.
    7. Banana Family.
    8. Iris Family.
    9. Pineapple Family.
    10. Amaryllis Family.
    11. Pickerel-weed Family.
    12. Lily (Trillium) Family.
    13. Spiderwort Family.
    14. Smilax Family.
    15. Rush Family.
    16. Arrow-grass Family.
    17. Yellow-eyed Grass Family.
    18. Pipewort Family.
    19. Tillandsia, Pineapple Family.
    20. Lily Family.
  - 3. *Glumaceous.*
    1. Rush Family.
    2. Sedge Family.
    3. Grass Family.

CHAPTER II.—CRYPTOGAMOUS (FLOWERLESS).

I. *Horse-tail.*
II. *Fern.*
III. *Club-moss.*

CHAPTER III.—PARTS OF PLANTS.

- I. Leaves.
  - 1. *Parts.*
    1. Blade.
    2. Petiole.
    3. Stipules.
    4. Sheath.
    5. Ligule.
    6. Color.
  - 2. *Venation.*
    1. Veinlets.
    2. Vein.
    3. Midrib.
    4. Feather-vein.
    5. Palmate.
  - 3. *Margin.*
    1. Entire.
    2. Serrate. (1. Coarsely. 2. Finely.)
    3. Dentate.
    4. Crenate.
    5. Repand.

- I. Leaves.
  - 4. *Base.*
    1. Cordate.
    2. Auriculate.
    3. Hastate.
    4. Sagittate.
    5. Oblique.
    6. Tapering.
    7. Clasping.
    8. Connate.
    9. Decurrent.
  - 5. *Apices.*
    1. Acute.
    2. Acuminate.
    3. Obtuse
    4. Truncate.
    5. Retuse.
    6. Obcordate.
    7. Emarginate.
    8. Mucronate.
    9. Cuspidate.
  - 6. *Lobes.*
    1. Acute.
    2. Sub-acute.
    3. Sinuses.
       1. Open.
       2. Shut.
       3. Sharp.
       4. Deep.
       5. Broad.
  - 7. *Kinds.*
    1. Sessile.
    2. Stipulate.
    3. Petiolate.
    4. Exstipulate.
       1. Simple.
       2. Compound.
  - 8. *Forms.*
    1. Runcinate.
    2. Bipinnatifid.
    3. Pedate.
    4. Curled.
    5. Peltate.
    6. Kidney-shaped.
    7. Lyrate.
  - 9. *Petiole.*
    1. Round.
    2. Half round.
    3. Long.
    4. Short.
  - 10. *Surface.*
    1. Hairy.
    2. Glabrous.
    3. Smooth.
    4. Rough.
    5. Shiny.
    6. Dull.
  - 11. *Color.*
    1. Light.
    2. Dark.
    3. Spotted.
    4. Striped.
  - 12. *Simple leaves.*
  - 13. *Compound leaves.*
    1. Leaflet.
    2. Petiolule.
    3. Stipules.
       1. Free.
       2. Adnate.
       3. Prickly.
       4. Ochreate.
    4. Rachis.
    5. Pinnate.
       1. Abrupt.
       2. Unequally.
       3. Cirrose.
    6. Digitate.
       1. Three-fingered.
       2. Five-fingered.
       3. Seven-fingered.

II. STEM.

1. *Parts of stems.*
   1. Node.
   2. Internode.
   3. Axil of leaf.
2. *Appendages.*
   1. Terminal bud.
   2. Axillary.
   3. Branch.
3. *Position of leaves on stem.*
   1. Stem leaves.
   2. Radical leaves.
4. *Arrangement of leaves on stem.*
   1. Alternate.
   2. Opposite.
   3. Whorled.
5. *Shape of stem.*
   1. Round.
   2. Compressed.
   3. Half round.
   4. Fluted.
   5. Acute angled.
   6. Triangular.
   7. Square.
   8. Five-sided.
   9. Four-angled.
6. *Altitude of stem.*
   1. Erect.
   2. Drooping.
   3. Creeping.
   4. Trailing.
   5. Climbing.
   6. Twining.
7. *Color of stem.*
   1. Spotted.
   2. Striped.
   3. Light.
   4. Dark.
   5. Green.
   6. Variegated.
8. *Surface of stem.*
   1. Smooth.
   2. Shining.
   3. Hairy.
   4. Glabrous.
   5. Rough.
   6. Dull.
9. *Size of stem.*
   1. High.
   2. Low.
   3. Slender.
   4. Thick.
10. *Structure of stem.*
    1. Hollow.
    2. Solid.
    3. Woody.
    4. Herbaceous.

III. INFLORESCENCE.

1. *Kinds.*
   1. Solitary.
      1. Terminal.
      2. Axillary.
   2. Clustered.
      1. Terminal.
      2. Axillary.
2. *Parts.*
   1. Peduncle.
   2. Bracts.
   3. Involucre.
   4. Pedicel.

III. INFLORESCENCE.
- 2. *Parts.*
  - 5. Rachis.
  - 6. Receptacle.
- 3. *Altitude.*
  - 1. Erect.
  - 2. Bending.
  - 3. Pendulous.
- 4. *Varieties.*
  - 1. Spike.
  - 2. Spadix.
  - 3. Catkin.
  - 4. Raceme.
  - 5. Glomerule.
  - 6. Corymb.
  - 7. Umbel.

IV. THE FLOWER.
- 1. *Parts.*
  - 1. Receptacle.
  - 2. Calyx.
  - 3. Corolla.
  - 4. Perianth.
  - 5. Stamens.
  - 6. Pistil.
- 2. *Calyx.*
  - 1. Sepal.
  - 2. Polysepalous.
  - 3. Gamosepalous.
  - 4. Regular.
- 3. *Corolla.*
  - 1. Petals.
    - 1. Limb.
    - 2. Claw.
  - 2. Polypetalous.
  - 3. Gamopetalous.
  - 4. Regular.
  - 5. Irregular.
- 4. *Perianth.*
  - 1. Regular.
  - 2. Irregular.
- 5. *Stamens.*
  - 1. Filament.
  - 2. Anther.
  - 3. Pollen.
- 6. *Pistil.*
  - 1. Ovary.
  - 2. Style.
  - 3. Stigma.

V. ROOT.
- 1. *Tap root.*
  - 1. Conical.
  - 2. Fusiform.
  - 3. Napiform.
- 2. *Fibrous root.*
  - 1. Moniliform.
  - 2. Fasciculated.
  - 3. Tubercular.

VI. SEED. 1. *Parts.*
- 1. Body.
  - 1. Embryo.
    - 1. Cotyledon.
    - 2. Radical.
    - 3. Plumule.
  - 2. Albumen.
- 2. Seed coat.
- 3. Nucleus.

VII. WOODY PLANTS.
- 1. *Tree.*
  - 1. Head.
  - 2. Trunk.
    - 1. Stock.
    - 2. Bark.
    - 3. Wood.
    - 4. Pith.
- 2. *Bush.*
- 3. *Shrub.*
- 4. *Vine.*

SECTION XII.

ZOOLOGY.

CHAPTER I.—INVERTEBRATES.

- I. Protozoa.
  - 1. *Gregarinidæ.*
  - 2. *Rhizopoda.*
    1. Monera.
    2. Amœbea.
    3. Foraminifera.
    4. Radiolaria.
    5. Spongida.
  - 3. *Infusoria.*
    1. Ciliata.
    2. Flagellata.
    3. Suctoria.
- II. Cœlenterata.
  - 1. *Hydrozoa.*
    1. Hydroida.
    2. Corynida.
    3. Sertularida.
  - 2. *Siphonophora.*
    1. Calycophoridæ.
    2. Physophoridæ.
    3. Lucernarida.
    4. Pelagidæ.
    5. Rhizostomidæ.
  - 3. *Actinozoa.*
    1. Zoantharia.
    2. Alcyonaria.
    3. Ctenophora.
- III. Annuloida.
  - 1. *Echinodermata.*
    1. Crinoidea (Feather-stars).
    2. Ophiuroidea (Sand-stars).
    3. Asteroida (Star-fishes).
    4. Echinoidea (Sea-urchins).
    5. Holothuroidea (Sea-cucumbers).
  - 2. *Scolecida.*
    1. Taeniada (Tape-worms).
    2. Trematoda (Flukes).
    3. Turbellaria (Ribbon-worms).
    4. Acanthocephala (Thorn-headed worms).
    5. Gordiacea (Hair-worms).
    6. Nematoda (Round-worms).
    7. Rotifera (Wheel-animalcules).
- IV. Annulosa.
  - 1. *Anarthropoda.*
    1. Gephyrea.
    2. Annelida.
      1. Hirudinea (Leeches).
      2. Oligochaeta (Earth-worms).
      3. Tubicola (Tube-worms.)
      4. Errantia (Sand-worms).

- IV. ANNULOSA.
  - 2. *Arthropoda.*
    - 1. Crustacea.
    - 2. Rhizocephala.
    - 3. Ichthyophthira.
    - 4. Cirripedia.
    - 5. Phyllopoda.
    - 6. Amphipoda.
    - 7. Decapoda.
  - 3. *Arachnida.*
    - 1. Podosomata.
    - 2. Pedipalpi.
    - 3. Araneida.
  - 4. *Myriapoda.*
    - 1. Chilopoda.
    - 2. Chilognatha.
    - 3. Pauropoda.
  - 5. *Insecta.*
    - 1. Anoplura.
    - 2. Mallophaga.
    - 3. Thysanura.
    - 4. Hemiptera.
    - 5. Orthoptera.
    - 6. Neuroptera.
    - 7. Aphaniptera.
    - 8. Diptera.
    - 9. Lepidoptera.
    - 10. Hymenoptera.
    - 11. Strepsiptera.
    - 12. Coleoptera.
- V. MOLLUSCA.
  - 1. *Molluscoida.*
    - 1. Polyzoa.
    - 2. Tunicata.
    - 3. Brachiopoda.
  - 4. Lamellibranchiata.
  - 5. Gasteropoda.
  - 6. Pteropoda.
  - 7. Cephalopoda.

CHAPTER II.—VERTEBRATES.

- I. PISCES.
  - 1. Pharyngobranchii.
  - 2. Marsipobranchii.
  - 3. Teleostei.
  - 4. Ganoidei.
  - 5. Elasmobranchii.
  - 6. Dipnoi.
- II. AMPHIBIA.
  - 1. Labyrinthodontia. (Extinct.)
  - 2. Ophiomorpha.
  - 3. Urodela.
  - 4. Anoura.
- III. REPTILIA.
  - 1. Chelonia (Tortoises).
  - 2. Ophidia (Snakes).
  - 3. Lacertilia (Lizards).
  - 4. Crocodilia (Crocodiles).

- III. Reptilia.
  - 5. Ichthyopterygia.
  - 6. Sauropterygia.
  - 7. Pterosauria.
  - 8. Anomodontia.
  - } Extinct.
- IV. Aves.
  - 1. *Natatores* (Swimmers).
    - 1. Penguins.
    - 2. Gulls.
    - 3. Ducks.
    - 4. Geese.
    - 5. Flamingoes, etc.
  - 2. *Grallatores* (Waders).
    - 1. Water-hens.
    - 2. Cranes.
    - 3. Herons.
    - 4. Storks.
    - 5. Snipes.
    - 6. Woodcock.
    - 7. Plovers.
    - 8. Curlews, etc.
  - 3. *Cursores* (Runners).
    - 1. Ostrich.
    - 2. Emeu.
    - 3. Cassowary, etc.
  - 4. *Rasores* (Scratchers).
    - 1. Grouse.
    - 2. Ptarmigan.
    - 3. Partridges.
    - 4. Pheasants.
    - 5. Turkey.
    - 6. Guinea fowl.
    - 7. Domestic fowl.
    - 8. Pea fowl.
    - 9. Doves.
    - 10. Pigeons, etc.
  - 5. *Scansores* (Climbers).
    - 1. Cuckoos.
    - 2. Woodpeckers.
    - 3. Parrots.
    - 4. Cockatoos.
    - 5. Parrakeets.
    - 6. Toucans.
    - 7. Trogons, etc.
  - 6. *Insessores* (Perchers).
    - 1. Crows.
    - 2. Magpies.
    - 3. Jays.
    - 4. Starlings.
    - 5. Grosbeaks.
    - 6. Larks.
    - 7. Thrushes.
    - 8. Orioles.
    - 9. Wrens.
    - 10. Martins.
  - 7. *Raptores* (Birds of prey).
    - 1. Owls.
    - 2. Hawks.
    - 3. Falcons.
    - 4. Eagles.
    - 5. Vultures, etc.

- IV. Aves.
  - 8. *Oscines* (Singers).
    1. Robins.
    2. Humming-birds.
    3. Lark.
    4. Swallow.
    5. Sparrow.
    6. Bluebird, etc.
- V. Mammalia.
  - 1. *Monotremata.*
    1. Duck moles.
    2. Ant-eaters.
  - 2. *Marsupialia* (Pouched).
    1. Kangaroos.
    2. Phalangers.
    3. Tasmanian devil.
  - 3. *Edentata* (Toothless).
    1. Sloths.
    2. Armadillos.
    3. Hairy Ant-eaters.
    4. Scaly Ant-eaters.
  - 4. *Sirenia.*
    1. Manatus.
    2. Dugong.
  - 5. *Cetacea.*
    1. Whalebone whale.
    2. Sperm whale.
    3. Dolphins.
    4. Porpoises.
  - 6. *Ungulata* (Hoofed).
    1. Rhinoceros.
    2. Horse.
    3. Ass.
    4. Zebra.
    5. Hippopotamus.
    6. Hogs.
    7. Peccaries.
    8. Camels.
    9. Llama.
    10. Giraffe.
    11. Stags.
    12. Elk.
    13. Sheep.
    14. Reindeer.
    15. Antelopes.
    16. Oxen.
    17. Buffalo.
    18. Bison, etc.
  - 7. *Hyracoidea.* Hyrax.
  - 8. *Proboscidea.* Elephants.
  - 9. *Carnivora* (Flesh-eaters).
    1. Seals.
    2. Bears.
    3. Raccoons.
    4. Badgers.
    5. Weasels.
    6. Otters.
    7. Civets.
    8. Dogs.
    9. Wolves.
    10. Foxes.
    11. Hyena.
    12. Cat.
    13. Lynx.
    14. Tigers, etc.

- V. Mammalia.
  - 10. *Rodentia* (Gnawers).
    1. Rabbits.
    2. Hares.
    3. Porcupines.
    4. Beavers.
    5. Mice.
    6. Rats.
    7. Squirrels.
    8. Dormice. etc.
  - 11. *Chiroptera* (Winged).
    1. Bats.
    2. Vampire bats.
    3. Horse-shoe bats.
    4. Flying squirrels, etc.
  - 12. *Insectivora.*
    1. Shrew-mice.
    2. Hedgehog.
  - 13. *Quadrumana* (Four-handed).
    1. Spider Monkeys.
    2. Baboons.
    3. Ourang-Outang.
    4. Chimpanzee, etc.
  - 14. *Bimana* (Man).

SECTION XIII.

PHYSIOLOGY.

CHAPTER I.—THE SKELETON.

I. THE BONES.

1. *Number of Bones.*
2. *Uses of the Bones.*
   1. To protect delicate organs.
   2. Act as levers.
   3. Preserve the shape of body.
3. *Composition of Bones.*
4. *Structure of Bones.*
5. *Growth of Bones.*
6. *Repair of Bones.*
7. *Joints.*
8. *Classification of Bones.*
   1. Head.
      1. The Skull.
      2. The Face.
   2. Trunk.
      1. Spine.
         1. Number of Bones.
         2. Curvature.
         3. Skull articulate.
      2. Ribs.
         1. Number.
         2. Uses.
      3. Hip Bones.
         1. Pelvis.
         2. Sacrum.
9. *Upper Limbs.*
   1. Shoulder.
      1. Clavicle.
      2. Scapula.
   2. Arm.
      1. Humerus.
      2. Ulna.
      3. Radius.
      4. Carpus.
   3. Hand.
      1. Metacarpal.
      2. Phalanges.
10. *Lower Limbs.*
    1. The Hip.—1. Femur.
    2. The Knee.
       1. Patella.
       2. Tibia.
       3. Fibula.
    3. The Foot.
       1. Tarsus.
       2. Metatarsus.
       3. Phalanges.
       4. Deformities.
11. *Diseases of the Bones.*
    1. Rickets.
    2. Felon.
    3. Bow-legs.
    4. Curvature of Spine.
    5. Sprains.
    6. Dislocation.
    7. Fracture.

CHAPTER II.—THE MUSCLES.

I. Their number.
II. Their use.
III. Their arrangement.
IV. Their kinds. — 1. Voluntary. 2. Involuntary.
V. Their structure.
VI. Tendons.
VII. As levers of the body.
VIII. Attached at the joints.
IX. They enable us to stand erect.
X. Muscular sense.
XI. Exercise necessary.
XII. Time to exercise.
XIII. Kinds of exercise.
XIV. Diseases of the muscles. — 1. St. Vitus's Dance. 2. Convulsions. 3. Locked-jaw. 4. Gout. 5. Rheumatism. 6. Ganglion. 7. Lumbago.

CHAPTER III.—THE INTEGUMENT, OR SKIN.

I. The structure of the skin.
II. The use of the skin.
III. Effect on complexion.
IV. Appendages of the skin. — 1. *The Hair.* 2. *The Nails.* 3. *The Mucous Membrane.* 4. *The Teeth.* — 1. The milk teeth. 2. The permanent. 3. The structure. 4. Their positions. 5. Their decay. 6. Their preservation.
V. The glands of the skin. — 1. *The Oil Glands.* 2. *The Perspiratory.*—1. Perspiration. 3. *Absorbing properties.*
VI. Bathing necessary. — 1. *Reaction.* 2. *Sea bathing.* 3. *Clothing.*
VII. Diseases of the skin. — 1. *Erysipelas.* 2. *Dropsy.* 3. *Corns.* 4. *Warts.* 5. *Chilblains.* 6. *Deformities of nails.*

CHAPTER IV.—RESPIRATION.

- I. Organs of respiration.
  1. Trachea.
  2. Bronchial tubes.
  3. Lungs.
  4. Pleura.
  5. Cillia.
- II. Respiration.
  1. Inspiration.
  2. Expiration.
- III. Modifications of the breath.
  1. Sighing.
  2. Sneezing.
  3. Coughing.
  4. Snoring.
  5. Laughing.
  6. Crying.
  7. Hiccough.
  8. Yawning.
- IV. Capacity of lungs.
- V. Necessity of air.
- VI. Action of air.
- VII. Rebreathing.
- VIII. Ventilation.
- IX. Diseases of lungs.
  1. Constriction of the Lungs.
  2. Bronchitis.
  3. Pleurisy.
  4. Pneumonia.
  5. Consumption.
  6. Asphyxia.
  7. Diphtheria.
  8. Croup.

CHAPTER V.—THE VOICE.

- I. Organs of voice.
  1. Lungs.
  2. Glottis.
  3. Epiglottis.
- II. Vocal cords.
- III. Tones of the voice.
- IV. Speech.

CHAPTER VI.—CIRCULATION.

- I. Organs of circulation.
  1. *The Heart.*
     1. Movements.
        1. Diastole.
        2. Systole.
     2. Auricles.
     3. Ventricles.
     4. Valves.
        1. Tricuspid.
        2. Bicuspid.
        3. Semi-lunar.
  2. *The Arteries.*
     1. Arterial system.
     2. The Pulse.
  3. *Veins.*
  4. *Capillaries.*

II. The uses of blood.
III. Transfusion of blood.
IV. Coagulation.
V. Lesser circulation.
VI. Greater circulation.
VII. Velocity of the blood.
VIII. Diffusion of heat by the blood.
IX. Change of tissue.
X. The vital organs.
XI. Lymphatic circulation.
  1. Lymph.
  2. Use of Lymphatics.
XII. Diseases of blood.
  1. Congestion.
  2. Inflammation.
  3. Bleeding.
  4. Scrofula.
  5. Colds.
  6. Catarrh.

CHAPTER VII.—FOOD.

I. Sources of food.
  1. The earth.
  2. The atmosphere.
II. Organic food.
  1. *Albuminoids.*
    1. Albumen.
    2. Fibrin.
    3. Glutin.
    4. Casein.
  2. *Fats and Oils.*
  3. *Sugars.*
    1. Sugar.
    2. Starch.
    3. Gums.
III. Inorganic food.
  1. *Water.*
  2. *Salt.*
  3. *Lime.*
  4. *Iron.*
  5. *Soda.*
  6. *Potash.*
  7. *Magnesia.*
IV. Stimulants.
  1. *Spices.*
  2. *Flavors.*
  3. *Tea.*
  4. *Coffee.*
  5. *Acids.*
V. Proper food necessary.
  1. For waste and repair.
  2. For hunger and thirst.
  3. In quantity.
VI. Mixed food.
  1. Cooked.
  2. Raw.
VII. Kinds of food.
  1. *Animal.*
    1. Milk.
    2. Eggs.
    3. Meats.
    4. Fish.

VII. KINDS OF FOOD. 2. *Vegetable.*
1. Bread.
2. Potato.
3. Fruit.
4. Alcohol.

CHAPTER VIII.—DIGESTION.

I. NECESSARY FOR ASSIMILATION OF FOOD.
II. MANNER OF DIGESTION.
III. MASTICATION.
1. Saliva.
2. Swallowing.
IV. GASTRIC DIGESTION.
1. The Stomach.
2. Gastric Juice.
V. INTESTINAL DIGESTION.
1. Bile.
2. Pancreatic Juice.
VI. ABSORPTION.
3. Small Intestines.
VII. THE NATURE OF DIGESTION.
VIII. THE TIME REQUIRED.
IX. COOKING FOOD AIDS THE DIGESTION.
X. RAPID EATING RETARDS DIGESTION.
XI. AMOUNT OF FOOD TAKEN.
XII. TIME IT SHOULD BE TAKEN.
XIII. MANNER OF EATING.
XIV. FOOD SHOULD BE CHANGED.
XV. DISEASES.
1. Dyspepsia.
2. Mumps.

CHAPTER IX.—THE NERVOUS SYSTEM.

I. THE BRAIN.
II. THE CEREBRUM.
III. THE CEREBELLUM.
IV. THE SPINAL CORD.
V. THE TRANSFER OF PAIN BY THE NERVES.
VI. SPINAL NERVES.
VII. CRANIAL NERVES.
1. Olfactory.
2. Optic.
3. Motores oculi.
4. Tri-facial.
5. Facial.
6. Auditory.
7. Glos-so pha-ryngeal.
8. Pneumogastric.
9. Accessory.
10. Hypoglossal.

VIII. Sympathetic system.
- 1. *Crossing cords.*
- 2. *Reflection.*
- 3. *Brain exercise.*
- 4. *Sleep.*
- 5. *Alcoholic effects.*
- 6. *Sunlight necessary.*
  - 1. Excitement.
  - 2. Muscular weakness.
  - 3. Mental weakness.

CHAPTER X.—SPECIAL SENSES.

I. The touch.
- 1. Use of Touch.
- 2. Delicacy of Touch.

II. The taste.
- 1. Location of the Taste.
- 2. Uses of the Taste.

III. The smell.
- 1. Nostrils.
- 2. Necessity of Smell.

IV. The hearing.
- 1. *The Ear.*
  - 1. External.
  - 2. Middle.
  - 3. Internal.
- 2. *Sound Waves.*
- 3. *Care of the Ear.*

V. The eyes, or sense of sight.
- 1. Eyelids.
- 2. Tears.
- 3. The Retina.
- 4. How we see.
- 5. Near Sight.
- 6. Far Sight.
- 7. Care of the Eyes.
- 8. The protection of the Eyes.

CHAPTER XI.—HEALTH AND DISEASE.

I. Nature of disease.
II. How to prevent disease.
III. How to cure disease.
IV. Death.
V. Decay.

SECTION XIV.

NATURAL PHILOSOPHY.

CHAPTER I.—MATTER.

- I. IMPONDERABLE.
- II. PONDERABLE.
  - 1. *Solid.*
  - 2. *Fluid.*
    - 1. Aëriform.
      - 1. Gases.
      - 2. Vapors.
    - 2. Liquid.
- III. BODIES.
  - 1. *Simple.*
  - 2. *Compound.*
- IV. PROPERTIES OF MATTER.
  - 1. *Universal.*
    1. Extension.
    2. Figure.
    3. Impenetrability.
    4. Indestructibility.
    5. Inertia.
    6. Divisibility.
    7. Porosity.
       1. Density.
       2. Rarity.
    8. Compressibility.
    9. Expansibility.
    10. Mobility.
    11. Gravitation.
  - 2. *Accessory.*
    1. Cohesion.
    2. Adhesion.
    3. Hardness.
    4. Tenacity.
    5. Elasticity.
    6. Brittleness.
    7. Malleability.
    8. Ductility.

CHAPTER II.—MECHANICS.

- I. FORCE.
  - 1. *Rest.*
    1. Absolute.
    2. Relative.
  - 2. *Motion.*
    1. Absolute.
    2. Relative.
    3. Velocity.
       1. Uniform.
       2. Accelerated.
       3. Retarded.
    4. Kinds.
    5. Momentum.
    6. Striking force.
    7. Centrifugal force.
    8. Simple motion.
    9. Resultant motion.
    10. Reflected.
    11. Action and reaction.
    12. Laws of motion. (See over.)

1st Law.—A body at rest remains at rest; a body in motion moves in a straight line with uniform velocity, unless acted upon by some external force.

2d Law.—A given force always produces the same effect, whether the body upon which it acts is in motion or at rest; whether it is acted upon by that force alone or by others at the same time.

3d Law.—Reaction is always equal to action, and opposite to it in direction.

II. GRAVITY.
- 1. *Direction.*
  1. Weight above the earth's surface.
  2. At different parts of the surface.
- 2. *Weight.*
  3. Law. — All objects weigh most at the surface of the earth. Ascending from the surface, their weight diminishes as the square of their distance from the centre increases; descending towards the centre, their weight diminishes as their distance from the surface increases.
- 3. *Laws of Gravity.*
  1. The force of gravity increases as the amount of matter increases.
  2. The force of gravity decreases as the square of the distance increases.
- 4. *Falling Bodies.*
  1. Law. — Gravity gives a falling body a certain velocity in the first second of its descent; and still forcing it downward, it increases that velocity in the following seconds till it reaches the earth.
  2. Bodies thrown downward.
  3. Parachute.
  4. Ascending bodies.
- 5. *Projectiles.*
  1. Forces acting upon projectiles. — 1. The force by which it was thrown. 2. Gravity. 3. Resistance of the air.
  2. Path of projectiles.
  3. Random.
  4. Gunnery.
- 6. *Pendulum.*
  1. Application to clock-work.
  2. Gridiron Pendulum.
  3. Laws of Pendulum:

1st Law of Pendulum, or Vibration.—The vibrations of a given pendulum are performed in very nearly the same time, whether it moves through longer or shorter space.

2d Law.—The vibrations of pendulums of different lengths are performed in different times; and their lengths are proportioned to the squares of their times of vibration.

3d Law.—The vibrations of the same pendulum are not performed in the same time at all parts of the earth's surface; but, being caused by gravity, differ slightly, like gravity, according to the distance from the earth's centre.

- II. GRAVITY.
  - 7. *Centre of Gravity.*
    1. How found.
    2. Stability of bodies.
    3. Effect of Rotary motion.
    4. Centre of gravity in man.
    5. Equilibrium.
  - 8. *Motive Power.*
    1. Gravity.
    2. Springs.
    3. Strength of man.
    4. Wind.
    5. Water.
    6. Steam.
  - 9. *Resistance.*
    1. Units of work.
    2. Horse-power.
    3. Friction.
       1. Sliding.
       2. Rolling.
       3. Modes of lessening.
- III. MACHINES.
  - 1. *Perpetual motion.*
  - 2. *Law of machines.* — What a machine gains in amount of work, it loses in time; and what it gains in time, it loses in amount of work.
  - 3. *Advantages of using machinery.*
  - 4. *Mechanical powers.*
    1. Lever. (See below.)
    2. Wheel-and-Axle. (See below.)
    3. Pulley. (See over.)
    4. Inclined Plane. (See over.)
    5. The Wedge. (See over.)
    6. The Screw. (See over.)
    7. Wheel-work. (See over.)

1. Lever.
  1. Levers of the first class.
     1. Law. — With levers of the first kind, intensity of force is gained, and time is lost, in proportion as the distance between the power and the fulcrum exceeds the distance between the weight and fulcrum.
     2. Balance.
     3. Steelyards.
     4. Bent levers.
     5. Compound levers.
  2. Levers of the second class. — With levers of the second class, intensity of force is gained, and time lost, in proportion as the distance between the power and the fulcrum exceeds the distance between the weight and fulcrum.
  3. Levers of the third class. — With levers of the third class, intensity of force is lost, and time gained, in proportion as the distance from the weight to the fulcrum exceeds the distance from the power to the fulcrum.

2. Wheel-and-axle.
  1. Law. — With the wheel-and-axle, intensity of force is gained, and time lost, in proportion as the circumference of the wheel exceeds that of the axle.

III. MACHINES.—4. *Mechanical Powers.*

2. Wheel-and-axle. 2. Different forms. 1. Capstan. 2. Windlass.

3. Pulley. 1. Fixed. 2. Movable. 3. White's. 4. Law. — With movable pulleys, a power will balance a weight as many times greater than itself as twice the number of movable pulleys employed.

4. Inclined plane. 1. Bodies rolling down a plane. 2. Law. — With an inclined plane, intensity of force is gained, and time lost, in proportion as its length exceeds its height.

5. The wedge. 1. First kind of wedge. 2. Second kind of wedge. 3. Advantages of wedge. 4. Law of Wedge. — With a given thickness, the longer the wedge, the easier it will penetrate.

6. The screw. 1. The Convex. 2. The Concave. 3. Advantages of the screw. 4. Hunter's Screw. 5. Endless Screw.

7. Wheel-work. 1. Modes of connection. 2. Rack and Pin. 3. Forge Hammer. 4. Cranks. 5. Fly-wheels. 6. Clocks and Watches. 1. Friction. 2. Bands. 3. Teeth. (1. Spur. 2. Crown. 3. Bevel.) (1. Clock-work. 2. Watch-work.)

IV. HYDROSTATICS.

1. *Nature of liquids.*
2. *Law.*—Water always, at rest, finds its level.
3. *Artesian wells.*
4. *Springs.*
5. *Locks.*
6. *Spirit Levels.*
7. *Pressure of liquids.*—Laws:
   1. Liquids, subjected to pressure, transmit it undiminished in all directions.
   2. Liquids, influenced by gravity alone, press in all directions.
   3. The pressure of liquids in every direction is proportioned to their depth.
8. *Hydrostatic Paradox.*
9. *Hydrostatic Bellows.*
10. *Hydrostatic Press.*
11. *Specific Gravity of Liquids.*—Hydrometer.
12. *Specific Gravity of Solids.*
13. *Specific Gravity of Gases.*
14. *Capillary Attraction.* 1. Cause. 2. Examples. 3. Laws. (See below.) 4. Floating bodies 5. Endosmose. 6. Exosmose.

1st Law of Capillary Attraction. Different liquids rise to different heights in tubes of the same size.

2d Law.—The same liquid always rises to the same height in a tube of given size, and this height is proportioned to the fineness of the bore.

- V. HYDRAULICS.
  - 1. *Flowing through orifices.*
    - 1. Velocity.
    - 2. Course.
    - 3. Volume.
  - 2. *Flowing through pipes and streams.*
    - Rivers.
      - 1. Waves.
      - 2. Tides.
        - 1. Ebb.
        - 2. Flow.
  - 3. *Water-Wheels.*
    - 1. Propulsion of Boats.
    - 2. Machines for raising water.
    - 3. Archimedes' Screw.
    - 4. Chain Pump.
    - 5. Hydraulic Ram.

CHAPTER III.—PNEUMATICS.

- I. ELASTIC FLUIDS.
  - 1. *Gases.*
  - 2. *Vapors.*
- II. AIR.
  - 1. *Vacuums.*
  - 2. *Properties.*
    - 1. Compressible.
    - 2. Elastic.
    - 3. It has weight.
    - 4. Mariotte's law. The greater the pressure to which the fluids are subjected, the less space they occupy and the greater their density.
  - 3. *Atmospheric pressure.*—Barometer.
    - 1. Tube.
    - 2. Wheel.
  - 4. *Density of air at different levels.*
  - 5. *Effect of heat on air.*
    - 1. Rarefies.
    - 2. Balloons.
  - 6. *Air Pump.*
    - 1. Single-barrelled.
    - 2. Double-barrelled.
    - 3. Experiments.
  - 7. *Condenser.*
- III. PNEUMATIC MACHINES.
  - 1. *Siphon.*
  - 2. *Tantalus's Cup.*
  - 3. *Lifting Pump.*
  - 4. *Forcing Pump.*
  - 5. *Fire Engines.*
  - 6. *Centrifugal Pump.*
  - 7. *Stomach Pump.*

CHAPTER IV.—PYRONOMICS.

- I. NATURE OF HEAT.
  - 1. *Sensible.*
  - 2. *Latent.*
- II. SOURCES OF HEAT.
  - 1. *The Sun.*
  - 2. *Mechanical action.*
    - 1. By friction.
    - 2. By percussion.
  - 3. *Chemical action.*
    - 1. Combustion.
    - 2. Animal heat.
  - 4. *Electricity.*

III. DIFFUSION OF HEAT.
- 1. *By Conduction.*
  - 1. Good Conductors.—Solids.
  - 2. Bad Conductors.
    - 1. Porous bodies.
    - 2. Fibrous bodies.
    - 3. Liquids.
    - 4. Gases.
    - 5. Vapors.
  - 3. Conducting power of Solids.
  - 4. Conducting power of Liquids.
  - 5. Conducting power of Gases.
  - 6. Conducting power of Vapors.
- 2. *By Convection.*
- 3. *By Radiation.*
  - 1. Law. — Radiant heat diminishes in intensity as the square of the distance from the radiating body increases.
  - 2. Reflection.
  - 3. Absorption of Radiant heat.
  - 4. Transmission of heat.

IV. EFFECTS OF HEAT.
- 1. *Expansion.*
  - 1. Of Solids.
  - 2. Of Liquids.
  - 3. Of Gases.
  - 4. Of Vapors.
- 2. *Liquefaction.*
- 3. *Vaporization.*
- 4. *Condensation.*
- 5. *Incandescence.*
- 6. *Specific heat.*
  - 1. Thermometer.
  - 2. Differential.
  - 3. Pyrometer.
- 7. *Steam.*
  - 1. Generation of steam.
  - 2. Condensation.
  - 3. Steam-Engines.
    - 1. Hero's Engine.
    - 2. De Garay's Engine.
    - 3. De Cause & Branca's.
    - 4. Papin's.
    - 5. Watt's.
      - 1. Boiler.
      - 2. Safety-valve.
      - 3. Kinds.
        - 1. High Pressure.
        - 2. Low Pressure.
    - 6. Newcomen's.
  - 4. Uses of Engines.
    - 1. Stationary.
    - 2. Marine.
    - 3. Locomotive.

CHAPTER V.—OPTICS.

I. NATURE OF LIGHT.
- 1. *Rays.*
- 2. *Production.*
  - 1. Self-luminous bodies.
  - 2. Non-luminous bodies.
- 3. *Transmission of light.*
  - 1. Transparent bodies.
  - 2. Translucent bodies.
  - 3. Opaque bodies.
- 4. *The Media.*

II. SOURCES OF LIGHT.
1. *Sun and Stars.*
2. *Chemical Action.*
3. *Mechanical Action.*
4. *Electricity.*
5. *Phosphorescence.*

III. PROPAGATION OF LIGHT.
1. Light radiates from every point of a luminous surface in every direction.
2. In a uniform medium, light is propagated in straight lines.
3. Velocity.
4. *Law of intensity.*—The intensity of light diminishes according to the square of the distance from the luminous body that produces it.

IV. SHADOWS.—*Penumbra.*

V. REFLECTION AND REFLECTING SURFACES.
1. *Mirrors.*
   1. Plane.
   2. Concave.
   3. Convex.
2. *Law of reflection.* The angle of reflection is equal to the angle of incidence.
3. *Images.*
4. *Reflection from Mirrors.*
   1. From Plane.
   2. Kaleidoscope.
   3. Concave Mirrors.
   4. Convex Mirrors.

VI. REFRACTION OF LIGHT.
1. *By Atmosphere.*—Mirage.
2. *By Prisms and Lenses.*
   —1. Classes of Lenses:
   1. Double Concave.
   2. Plano-Concave.
   3. Double Convex.
   4. Plano-Convex.
   5. Concavo-Convex.
   6. Meniscus.
3. *By Convex Lenses.*
4. *By Concave Lenses.*
5. *By Multiplying Glass.*
6. *Double Refraction.*

1st Law of Refraction.—In a uniform medium, there is no refraction. It is only on passing from one medium to another, that a ray is turned from its course.

2d Law.—Only such rays as enter a medium obliquely are refracted,—not such as enter at right angles.

3d Law.—When a ray passes obliquely from a rarer to a denser medium, it is refracted towards a line perpendicular to the surface.

4th Law.—When a ray passes from a denser, into a rarer medium, it is refracted from the perpendicular.

VII. POLARIZATION OF LIGHT.

VIII. CHROMATICS.
1. *Solar Spectrum.*
2. *Difference of color.*
3. *Complementary colors.*
4. *Properties of the Spectrum.*
5. *Dark lines in the Spectrum.*
6. *Dispersion of Light.*
7. *Achromatic Lenses.*
8. *Rainbow.*
9. *Haloes.*

IX. VISION.
1. *The Eye.*—Parts of eye.
   1. Cornea.
   2. Iris.
   3. Pupil.
   4. Aqueous matter.
   5. Crystalline lens.

- IX. Vision.
  - 1. *The Eye.*
    - 1. Parts of eye.
      - 6. Vitreous matter.
      - 7. Retina.
      - 8. Choroid Coat.
      - 9. Sclerotic Coat.
      - 10. Optic Nerve.
    - 2. Uses.
  - 2. *Defects of vision.*
  - 3. *Images formed on Retina.*
  - 4. *Visual angle.*
  - 5. *Adaptation of the eye.*
- X. Optical instruments.
  - 1. *Camera Obscura.*
    - 1. Single.
    - 2. Compound.
    - 3. Solar Microscopes.
  - 2. *Microscope.*
  - 3. *Magic Lantern.*
    - 1. Phantasmagoria.
    - 2. Dissolving views.
  - 4. *Telescopes.*
    - 1. Refracting.
    - 2. Reflecting.

CHAPTER VI.—ACOUSTICS.

- I. Nature of sound.
- II. Origin of sound.
- III. Transmission of sound.
- IV. Velocity of sound.
- V. Distance transmitted.
- VI. Acoustic tubes.
  - 1. Speaking Trumpet.
  - 2. Stethoscope.
- VII. Interference of sound.
  - 1. Echoes.
- VIII. Reflection of sound.
  - 2. Ear Trumpets.
  - 3. Whispering Galleries.
- IX. Musical sounds.
  - 1. Loudness.
  - 2. Pitch.
  - 3. Quality.
- X. Musical instruments.
  - 1. *Stringed.*
    - 1. Pianos.
    - 2. Harps.
    - 3. Violins, etc.
  - 2. *Wind.*
    - 1. Kinds.
      - 1. Organ.
      - 2. Flute.
      - 3. Fife, etc.
    - 2. Manner of producing sound.
- XI. Gamut.
- XII. Harmony.
- XIII. Human voice.
  - 1. Vocal Organs.
  - 2. Vocal Chords.
  - 3. Ventriloquism.
  - 4. Stammering.
- XIV. The voice of inferior animals.
- XV. Human ear.
  - 1. Outer Ear.
  - 2. Inner Ear.
  - 3. Drum.

CHAPTER VII.—ELECTRICITY.

- I. Sources of electricity.
  1. Developed by Friction.
  2. Developed by Chemical Action.
  3. Developed by Magnetism.
  4. Developed by Heat.
- II. Attraction and repulsion.
- III. Nature of electricity.
- IV. Conduction.—Insulators.
- V. Path of the current.
- VI. Velocity of electricity.
- VII. Electrical machines.
  1. Cylinder machine.
  2. Plate.
  3. Insulating Stool.
  4. Leyden Jar.
  5. Battery.
- VIII. Mechanical effect of the passage of electricity.
- IX. Ignition by the electric spark.
- X. Electrophorous.
- XI. Electroscopes.
- XII. Electrometers.
- XIII. Electrical induction.
- XIV. Electricity from steam.
- XV. Atmospheric electricity.
- XVI. Voltaic electricity.
  1. *Origin.*
  2. *St. Elmo's fire.*
  3. *Fire Balls.*
  4. *Lightning.*
     1. Effects of lightning.
     2. Lightning Rods.
     3. Thunder.
- XVII. Galvani's theory.
- XVIII. Volta's theory.
- XIX. Galvanic batteries.
  1. *Dry Piles.*
  2. *Quantity and Intensity.*
  3. *Theory of the Battery.*
  4. *Difference between Frictional and Voltaic Electricity.*
  5. *Effect of Voltaic.*
     1. Decomposition.
     2. Protection of metals.
     3. Luminous and Heating.
     4. Physiological.
- XX. Thermo-Electricity.
  1. *How produced.*
  2. *Batteries.*

CHAPTER VIII.—MAGNETISM.

- I. Natural magnets.
  1. Poles.
  2. Power.
  3. Armature.
- II. Artificial magnets.
  1. Magnetic needles.
  2. Poles.
- III. Properties of the magnet.
  1. Attraction.
  2. Polarity.
  3. Magnetic variation.
  4. Magnetic Dip.
  5. Compass.
- IV. Law of attraction.
  Magnetic attraction decreases in intensity as the square of the distance from the magnet increases.

V. LAW OF POLARITY.—Like poles of magnets repel each other, and unlike poles attract each other.
VI. THEORY OF MAGNETISM.
VII. TERRESTRIAL MAGNETISM.—Magnetic intensity.

VIII. THE PRODUCTION OF ARTIFICIAL MAGNETS.
1. *By Induction.*
2. *By the Sun's rays.*
3. *By Contact with a Magnet.*
   1. Magnets in needles.
   2. In Horseshoes.
   3. In Bars.
4. *By Electric currents.*
   1. With currents.

IX. ELECTRO-MAGNETISM.
1. *Effect of electrical currents.*
2. *Connection between electricity and magnetism.*
3. *Electro-magnetic rotation.*
4. *Effect of electric currents upon Steel and Soft Iron.*
5. *The Helix.*
   1. Magnetizing power of the Helix.
   2. Electro-magnets.
6. *Electro-magnetism as a power.*
7. *Electro-magnetic telegraph.*
   1. Morse's.
   2. House & Bain's.
   3. Submarine.
8. *Electro-magnetic clocks.*
9. *Electro-magnetic Fire Alarms.*
10. *The Helix a magnet.*

X. ELECTRICITY.—Magnets.
XI. DIAMAGNETISM.

CHAPTER IX.—ASTRONOMY.

I. FUNDAMENTAL FACTS.
1. Space is filled with worlds, etc.
2. These are divided into systems.
3. The Stars are Suns.
4. Some have satellites.
5. The Earth is a planet.

II. THE SOLAR SYSTEM.
1. *The Sun.*
   1. Solar spots.
   2. Constitution of the sun.
   3. Motions of the sun.
   4. The Zodiacal light.
2. *The Planets.*
   1. The Orbits of the Planets.
   2. Bode's Law.
   3. Kepler's Laws:

1st Law.—The Orbits of the planets are ellipses having one focus in common, and in this common the sun is situated.

2d Law.—The radius Vector of a planet passes over equal areas in equal times.

3d Law.—The squares of the planet's times of revolution around the sun, are proportioned to the cubes of their distances *from* the sun.

2. *The Planets.*
   4. Real and apparent motions of planets.

II. The Solar System.

2. *The Planets.*

5. The Aspect of the Planets.
   1. Quadrature.
   2. Conjunction.
   3. Opposition.
   4. Transits.
   5. Occultation.

6. The Planets themselves.
   1. Mercury.
   2. Venus.
   3. The Earth.
      1. Its Motions.
      2. Its Orbit.
      3. Horizon, Zenith and Nadir.
      4. Eclipse.
      5. Zodiac.
      6. Change of Seasons.
   4. The Moon.
      1. Size.
      2. Motions.
      3. Phases.
   5. Mars.
   6. The Asteroids.
   7. Jupiter.
   8. Saturn.
   9. Uranus.
   10. Neptune.
   11. Real and apparent position of these Heavenly Bodies.
      1. Effect of Refraction.
      2. Effects of Parallax.
   12. Eclipses.
      1. Of Sun.
      2. Of Moon.
   13. Comets.
      1. Constitutions.
      2. Orbits.
      3. Velocity.
      4. Number.

3. *Fixed Stars.*
4. *Galaxy.*
5. *Nebulæ.*
   1. Magnitudes.
   2. Constellations.
   3. Distances from the earth.

CHAPTER X.—METEOROLOGY.

I. The Wind.
1. *Velocity.*
2. *Kinds.*
   1. Constant.
   2. Periodical.
   3. Variable.
      1. Hurricanes.
      2. Tornadoes.
      3. Waterspouts.

II. Atmospheric Moisture.
1. *Fog.*
2. *Clouds.*
   1. Nimbus.
   2. Cumulus.
   3. Cirrus.
   4. Stratus.
3. *Dew.*
4. *Rain.*
5. *Snow.*
6. *Hail.*

SECTION XV.

MENTAL PHILOSOPHY.

CHAPTER I.—EMPIRICAL PSYCHOLOGY.

- I. The attainment of facts.
  1. Fix the attention upon a fact.
  2. Compare facts.
  3. Analyze Complex facts.
- II. Final rule for disputed facts.
  1. Facts must come within Consciousness.
  2. The decision must be general.
  3. It must be unbiassed.
- III. Classification of facts.
  1. *The general facts of the mind.*
     1. The existence of the mind.
     2. This existence not ideal.
     3. The conscious identity through change.
     4. The mind self-active.
     5. Discriminates itself from its objects.
  2. *Original facts of the mind.*
     1. Sensation.
     2. Consciousness.
     3. Capacity for knowing, feeling and willing.
        1. Intellectual state.
        2. Emotional state.
        3. Willing state.

CHAPTER II.—INTELLECT.

- I. Sense.
  1. *External.*
     1. Observation.
     2. Attention.
  2. *Internal.*—Fancy.
- II. Understanding.
  1. *Memory.*
  2. *Conception.*
  3. *Association.*
  4. *Abstraction.*
     1. Analytical.
     2. Synthetical.
     3. Categorical.
     4. Hypothetical.
     5. Disjunctive.
  5. *Reflection.*
  6. *Judgment.*

- II. UNDERSTANDING.
  - 7. *Deductive.*
    1. Major Premises.
    2. Minor Premises.
    3. Conclusion.
  - 8. *Inductive.*
    1. Minor Premises.
    2. Major Premises.
    3. Conclusion.
  - 9. *Imagination.*
- III. REASON.
  1. Modifies sense and understanding.
  2. Comprehends nature by the Supernatural.
  3. Attains its own ideal of perfection.
  4. Inspires Fancy and Imagination.

CHAPTER III.—SUSCEPTIBILITY.

- I. ANIMAL.
  1. Instinct.
  2. Appetite.
  3. Natural affections.
  4. Selfishness.
  5. Disinterestedness.
- II. RATIONAL.
  1. Æsthetic Emotions.
  2. Scientific Emotions.
  3. Ethical Emotions.
  4. Conscience.
  5. Theistic Emotions.
- III. SPIRITUAL.
  1. *The process by which induced.*
  2. *Distinctions in spiritual sentiment.*
     1. Ethical.
     2. Religious.
     3. Christian.
     4. Sentiments of Love.
  3. *Union of responsibility with spiritual sentiment.*

CHAPTER IV.—THE WILL.

- I. COMPLETE CONCEPTIONS OF CAPACITY FOR WILLING.
  - 1. *Different Conceptions.*
    1. Capacity for preference.
    2. Capacity to choose what is agreeable.
    3. Power of self-determination.
    4. Power to choose happiness.
    5. Will is purely spontaneous.
  - 2. *What are complete conceptions of the will.*
    1. An act of the will must have its end.
    2. Must have an alternate kind.
    3. Must be an end in the Reason.

- II. Exercise of capacity for willing.
  1. *Conscious responsibility.*
  2. *Distinction between Brute and Human will.*
  3. *Man discriminates his own.*
  4. *Reciprocal complacency stands in liberty.*
  5. *Power to resist constitutional nature.*
  6. *Individual Consciousnesss.*
     1. Individual.
     2. Universal.
- III. Discrimination of acts of the will.
  1. From Spontaneity.
  2. From impulse of Appetite.
  3. From Desire.
  4. From Spiritual Affections.
- IV. Classifications of acts of the will.
  1. Immanent preference.
  2. For governing purposes.
  3. For desultory volitions.

CHAPTER V.—THE MIND CAN ATTAIN ITS END.

- I. Conception of causality.
  1. Occasional causes.
  2. Sufficient reasons.
  3. Habitual repetition.
  4. Invariable succession.
  5. Causality only regulates conceptions in our minds.
- II. True conceptions of cause.
  1. Simple succession.
  2. Qualified cause.
- III. Classification of causes.
  3. Mechanical cause.
  4. Physical cause.
  5. Vital cause.
  6. Spontaneous cause.
- IV. Grounds of certainty.
  1. *Negative.*
     1. Chance.
     2. Fate.
  2. *Positive.*
     1. Individual necessity.
     2. Absolute necessity.
  3. *Possible.*
     3. Physical necessity.
     4. Hypothetical necessity.
  4. *Applications of certainty.*
- V. Natural inability.
  1. Absolute necessity.
  2. Physical necessity.
  3. Hypothetical necessity.
  4. Strong desire.
  5. Balanced desires.
- VI. The mind an agent.
  1. Man as an animal agent.
  2. Man as a rational agent.
  3. Combination of rational and animal.
  4. Objections to liberty of Will.
- VII. Competency of the mind.
  1. *Natural competency.*
     1. Capable of determining law.
     2. Capable of obeying law.
     3. When wrong can change.
  2. *Moral competency.*

SECTION XVI.

CHEMISTRY.

CHAPTER I.—LIQUID AND AERIFORM MATTER.

- I. WATER.
  - 1. *Hydrogen.*
    1. Colorless.
    2. Transparent.
    3. Tasteless.
    4. Inodorous.
    5. Weighty.
    6. Compressible.
    7. Inflammable.
    8. Has Heat.
    9. Explosive.
  - 2. *Oxygen.*
    1. Colorless.
    2. Transparent.
    3. Tasteless.
    4. Inodorous.
    5. Has Weight.
    6. Inflammable.
    7. Promotes the burning of other bodies.
  - 3. *Common water, or water as commonly found.*
    1. It is impure.
    2. It dissolves other substances.
    3. It dissolves Air.
    4. It dissolves Gases.
    5. Impure water.
       1. Rain water.
       2. Spring water.
       3. River water.
       4. Mineral water.
    6. To purify water.
       1. By Distillation.
       2. By Refrigeration.
- II. THE ATMOSPHERE.
  - 1. *Nitrogen.*
    1. Colorless.
    2. Tasteless.
    3. Inodorous.
    4. Weighty.
    5. Harmless.
    6. Its absence causes death.
  - 2. *Water vapor.*
  - 3. *Dioxide.*
    1. Colorless.
    2. Weighty.
    3. Will extinguish fire.
    4. Will extinguish life.
    5. It is soluble.
    6. It is found in solution everywhere.
    7. Is in Soda Water.

- II. The Atmosphere.
  - 3. *Dioxide.*
    - 8. Is in Seltzer Water.
    - 9. Is a compound of—
      - 1. Oxygen.
      - 2. Carbon.
  - 4. *Oxygen.*
    - 1. Colorless.
    - 2. Transparent.
    - 3. Tasteless.
    - 4. Inodorous.
    - 5. Weighty, etc. (See page 91.)
  - 5. *It is a mixture of—*
    - 1. Oxygen.
    - 2. Nitrogen.
    - 3. Water Vapor.
    - 4. Dioxide.
  - 6. *Combustion.*
    - 1. Heat.
    - 2. Light.
  - 7. *Respiration.*
    - 1. Inhalation.
      - 1. Nitrogen.
      - 2. Oxygen.
      - 3. Water Vapor.
      - 4. Carbonic Dioxide.
    - 2. Exhalation.
      - 1. Nitrogen.
      - 2. Oxygen.
      - 3. Water Vapor.
      - 4. Carbonic Dioxide.
      - 5. Other offensive impurities.
    - 3. Ventilation.

CHAPTER II.—PLANTS.

- I. Composition.
  - 1. *Nitrogen.*
  - 2. *Oxygen.*
  - 3. *Hydrogen.*
  - 4. *Carbon.*
    - 1. Infusibility.
    - 2. Insoluble.
    - 3. Absorption.
    - 4. Durability.
    - 5. Combustible.
    - 6. Inflammable.
    - 7. Charcoal.
    - 8. Graphite.
    - 9. Diamonds.
- II. Growth of Plants.
  - 1. *Root.*
  - 2. *Stem.*
  - 3. *Leaves.*
  - 4. *Necessary elements.*
    - 1. Carbon.
    - 2. Hydrogen.
    - 3. Oxygen.
    - 4. Nitrogen.
  - 5. *Food.*
    - 1. Liquid food.
    - 2. Gaseous food.
  - 6. *Circulation of plants.*
- III. Substance of Plants.
  - 1. *Cellulose.*
    - 1. Tasteless.
    - 2. Insoluble.
    - 3. Is found in trunks of trees.
    - 4. Is found in straw and stalks of grain.

III. Substance of plants.
- 1. *Cellulose.*
- 2. *Starch.*
- 3. *Sugar.*
- 4. *Gum.*
- 5. *Oils.*
- 6. *Chlorophyl.*
- 5. Is found in the skin, seeds and core of fruits.
- 6. Is found in the Bran of Corn and Wheat.
- 7. Is found in the framework of leaves.
- 8. Is Combustible.
- 9. Is Explosive.
  - 1. Gun Cotton.
  - 2. Collodion.

IV. Decay of plants.—*Decomposition.*
- 1. Peat.
- 2. Bituminous Coal.
- 3. Anthracite Coal.
- 4. Petroleum.
  - 1. Naphtha.
  - 2. Kerosene.
  - 3. Asphaltum.

V. Effect of heat on wood.
- 1. *Charcoal.*
- 2. *Wood Tar.*
- 3. *Pyroligneous Acid.*
  - 1. Acetic Acid.
  - 2. Creosote.
  - 3. Wood-Spirit.
- 4. *Gases.*
  - 1. Marsh Gas.
  - 2. Olefiant Gas, or fire-damp.
  - 3. Illuminating Gases.
    - 1. From Wood.
    - 2. From Coal.
      - 1. Ammonia.
      - 2. Coal Tar.
      - 3. Carbolic Acid.
      - 4. Benzole.
      - 5. Nitro-Benzole.
      - 6. Analine.

CHAPTER III.—SOLIDS, ETC.

I. Marble.
- 1. *Carbonic Dioxide.*
- 2. *Lime.*
  - 1. Oxygen.
  - 2. Calcium.

II. Sandstone.
- 1. *Oxygen.*
- 2. *Silicon.*
  - 1. Amethyst.
  - 2. Opal.
  - 3. Chrysoprase.
  - 4. Jasper.
  - 5. Agate.
  - 6. Onyx.
  - 7. Chalcedony.
  - 8. Carnelian.

III. Slate.
- 1. *Silicia.*
- 2. *Alumina.*
  - 1. Oxygen.
  - 2. Aluminum.

IV. Granite.
- 1. *Silicon.*
- 2. *Aluminum.*
- 3. *Calcium.*
- 4. *Oxygen.*
- 5. *Potassium.*—1. Potash.
- 6. *Sodium.*
- 7. *Magnesium.*

V. Soils.
- 1. *Mineral.*
  - 1. Silicia.
  - 2. Lime.
  - 3. Magnesia.
  - 4. Potash.
  - 5. Soda.
  - 6. Oxide of iron.
  - 7. Sulphuric acid.
  - 8. Phosphoric acid.
- 2. *Organic.*

CHAPTER IV.—ELEMENTS.

I. Chlorine.
1. *Has color.*
2. *Is odorous.*
3. *Has weight.*
4. *Is soluble.*
5. *It has attraction for Hydrogen.*
6. *It removes color.*
7. *It is a disinfectant.*
8. *It has attraction for metals.*

II. Bromine.
1. *Liquid.*
2. *Bromides.*

III. Iodine.
1. *Solid.*
2. *Soluble.*
3. *Iodides.*
   - Mercuric-Iodide.
   - Iodide.

IV. Sulphur.—1. *Sulphides.*
1. Sulphide of Iron.
2. Galena.
3. Sulphurous Oxide.
4. Sulphuric Acid.
5. Sulphurous Acid.
6. Sulphuretted Hydrogen.
   - 1. Color.
   - 2. Combustibility.
   - 3. For Matches.

V. Phosphorous.—1. *Phosphates.*
1. Calcic Phosphate.
2. Phosphoric Oxide.
3. Phosphoric Acid.

VI. Arsenic.
1. *Solid.*
2. *Arsenous Oxide.*
   1. Colorless.
   2. Soluble.
   3. Tasteless.
   4. Inodorous
   5. Poisonous.
   6. Arseniuretted Hydrogen.

VII. Iron.
1. *Ores.*—1. Magnetic.—Lodestone.
2. *Hematite.*
3. *Carbonate of Iron.*
4. *Cast-Iron.*
   1. Carbon.
   2. Silicon.
   3. Phosphorous.
   4. Sulphur.
5. *Malleable Iron.*
6. *Steel.*

VIII. Copper.
1. *Copper Pyrites.*
2. *Malachite.*
3. *Smelting.*
4. *Uses for Alloys.*
   - 1. Brass.
   - 2. Bronze.
   - 3. German Silver.

IX. Zinc.
- 1. *Blende.*
- 2. *Red Oxide.*
- 3. *Smithsonite.*
- 4. *Properties.*
  - 1. Color.
  - 2. Weight.
  - 3. Brittleness.

X. Tin.
- 1. *Tin Stone.*
- 2. *Properties.*
  - 1. Brilliant.
  - 2. Malleability.
- 3. *Alloys.*
  - 1. Pewter.
  - 2. Britannia.

XI. Lead.
- 1. *Galena.*
- 2. *Properties.*
  - 1. Color.
  - 2. Malleability.
  - 3. Weight.
  - 4. Poisonous.
- 3. *Alloys.*—Type metal.

XII. Mercury. (Hydrargyrum.)
- 1. *Cinnabar.*
- 2. *Properties.*
  - 1. Color.
  - 2. Weight.
  - 3. Compounds.
    - 1. Corrosive Sublimate.
    - 2. Calomel.
- 3. *Liquid metal.*

XIII. Silver.
- 1. *Sulphide.*
- 2. *Properties.*
  - 1. The whitest metal.
  - 2. Malleable.
  - 3. Ductile.

XIV. Gold.
- 1. *Color.*
- 2. *Weight.*
- 3. *Malleable.*
- 4. *Uses.*

CHAPTER V.—CHEMICAL ATTRACTION.

I. *First Law.*—Every compound is always made up of the same elements, and always of the same proportion, by weight, of the elements.

II. *Second Law.*—If one substance combines with another in more than one proportion, these proportions are always multiples of the combining weight.

SECTION XVII.

GOVERNMENTAL SCIENCE.

CHAPTER I.—PRINCIPLES OF GOVERNMENT.

- I. Rights of persons.
  - 1. *Absolute.*
    1. Of personal security.
    2. Of personal liberty.
    3. Of private property.
  - 2. *Relative.*
    - 1. Public.
      1. To establish a government.
      2. To share in the government.
      3. To be protected by the government.
      4. Of Aliens.
      5. Of Citizens.
    - 2. Private.
      1. Master and Servant.
      2. Husband and Wife.
      3. Parent and Child.
      4. Guardian and Ward.
- II. Rights of things.
  - 1. *Real things.*
    1. Kinds.
    2. Tenures.
    3. Estates.
    4. Titles.
  - 2. *Personal things.*
    1. Their distribution.
    2. Property in them.
    3. Title to them.

    1. Gained by Occupancy.
    2. Gained by Custom.
    3. Gained by Succession.
    4. Gained by Marriage.
    5. Gained by Judgment.
    6. Gained by Grant.
    7. Gained by Contract.
    8. Gained by Testament.
    9. Gained by Administration.

CHAPTER II.—KINDS OF GOVERNMENT.

- I. Monarchical.
  1. *Absolute.*
  2. *Limited.*
  3. *Hereditary.*
  4. *Elective.*
- II. Aristocratic.
- III. Democratic.
  1. *Democracy.*
  2. *Republican.*
- IV. Patriarchal.

CHAPTER III.—STATE GOVERNMENTS.

- I. CONSTITUTION.
  1. *Nature.*
  2. *Convention.*
  3. *Adoption.*
  4. *Amendments.*
  5. *The Value.*
- II. ELECTORS.
  1. *Age.*
  2. *Sex.*
  3. *Residence.*
  4. *Aliens.*
  5. *Criminals.*
  6. *Idiots.*
  7. *Color.*
- III. ELECTIONS.
  1. *When held.*
  2. *Officers.*
  3. *Voting.*
  4. *Challenging.*
  5. *Registration.*
  6. *Canvassing.*
  7. *Plurality.*
  8. *Majority.*
- IV. DIVISIONS OF GOVERNMENT.
  1. *Legislature.*
     1. Senate.
        1. How composed.
        2. Qualifications of members.
        3. Terms.
        4. Appointment.
        5. Salary.
     2. Legislature, or Assembly.
        1. How composed.
        2. Qualifications of members.
        3. Terms.
        4. Appointment.
        5. Census.
        6. Vacancy.
        7. Salary.
        8. Privilege of members.
  2. *Meetings of Legislature.*
     1. Time.
     2. Place.
     3. Organization.
     4. Officers.
     5. Quorum.
     6. Interruption.
  3. *Enacting laws.*
     1. Rules.
     2. Governor's message.
     3. Introduction of Bills.
     4. Committees.
     5. Bills, etc.
     6. Readings.
     7. Passage.
     8. Concurrence of both Houses.
     9. Veto.
     10. Time of taking effect.
     11. Different manners of becoming law.
- V. STATE OFFICERS.—1. *Governor.*
  1. Qualifications.
  2. Term of service.

V. STATE OFFICERS.
- 1. *Governor.* 3. Powers.
  - 1. Executive Powers.
  - 2. Legislative Powers.
  - 3. Judicial Powers.
  - 4. Appointing Power.
- 2. *Lieutenant-Governor.*
- 3. *Secretary of State.*
- 4. *State Comptroller.*
- 5. *State Treasurer.*
- 6. *Attorney-General.*
- 7. *Superintendent of Public Instruction.*
- 8. *Surveyor-General.*
- 9. *Auditor-General.*
- 10. *State Printer.*
- 11. *State Librarian.*

VI. COUNTY OFFICERS.
- 1. *Necessity for counties.*
- 2. *Corporations.*
- 3. *Commissioners.*
- 4. *Treasurer.*
- 5. *Recorder.*
- 6. *Sheriff.*
- 7. *Coroner.*
- 8. *District-Attorney.*
- 9. *Surveyor.*
- 10. *Superintendent of Schools.*
  - 1. Qualifications.
  - 2. Manner of election.
  - 3. Length of term.
  - 4. Salary.

VII. TOWNSHIP OFFICERS.
- 1. Chief officer.
- 2. Treasurer.
- 3. Clerk.
- 4. Constables.
- 5. Supervisors.
- 6. School Directors.
- 7. Overseers of Poor.
- 8. Assessors.
- 9. Collectors.

VIII. CITIES AND TOWNS.
- 1. *Necessity for Incorporating.*
- 2. *Charter.*
- 3. *Officers.*
  - 1. City.
    - 1. Mayor.
    - 2. Aldermen.
    - 3. Councilmen.
    - 4. Police.
  - 2. Boro'.
    - 1. Burgess.
    - 2. Councilmen.
    - 3. Minor officers.

IX. TAXES.
- 1. *Necessity for.*
- 2. *Assessment.*
- 3. *Exonerations.*
- 4. *Apportionment.*
- 5. *Collection.*
- 6. *Tax sales.*
- 7. *Indirect taxes.*
  - 1. Imports.
  - 2. Customs.

X. EDUCATION.
- 1. Necessity for a system.
- 2. Object of the system.
- 3. Appropriation for schools.
- 4. Districts for schools.
- 5. Superintendent of schools.
- 6. Common schools.
- 7. Higher grades.

- X. Education.
  - 8. Academies.
  - 9. Colleges.
  - 10. Normal schools.
- XI. Public institutions.
  - 1. *Asylums.*
  - 2. *Alms-Houses.*
  - 3. *Hospitals.*
  - 4. *Prisons.*
    - 1. Jails.
    - 2. Work-Houses.
    - 3. Penitentiaries.
  - 5. *Railroads.*
  - 6. *Canals.*
- XII. Militia.
  - 1. Organization.
  - 2. How composed.
  - 3. Commanders.
  - 4. Training of.
  - 5. Volunteers.

CHAPTER IV.—JUDICIAL AND EXECUTIVE DEPARTMENTS OF GOVERNMENT.

- I. Judicial.
  - 1. *Courts.*
    - 1. Necessity for.
    - 2. Supreme.
    - 3. Circuit.
    - 4. Justices'.
    - 5. Probate.
    - 6. Chancery.
    - 7. Common Pleas.
    - 8. Quarter Sessions.
    - 9. Police.
    - 10. Officers.
      - 1. Whom.
      - 2. Term.
      - 3. Salary.
      - 4. How appointed.
  - 2. *Legal Proceedings.*
    - 1. Impeachment.
    - 2. Trial.
    - 3. Ordinary proceedings.
    - 4. Parties.
    - 5. Summons.
    - 6. Pleadings.
    - 7. Jury.
    - 8. Trial.
    - 9. Verdict.
    - 10. Judgment.
    - 11. Appeal.
    - 12. Execution.
      - 1. Against Property.
      - 2. Against Persons.
  - 3. *Criminal Proceedings.*
    - 1. Indictment.
    - 2. Arrest and Bail.
    - 3. Examination.
    - 4. Habeas Corpus.
    - 5. Trial.
  - 4. *Other Proceedings.*
    - 1. In Probate Courts.
    - 2. In Special Courts.
    - 3. In Equity Courts.
    - 4. In Argument Courts.

II. EXECUTIVE.
- 1. Execute the laws.
- 2. Appoint Officers.
- 3. Pardon Criminals.
- 4. Commander-in-Chief.

CHAPTER V.—UNITED STATES GOVERNMENT.

I. THE CONFEDERATION.
- 1. The Continental Congress.
- 2. Difficulties.
- 3. Taxes.
- 4. Duties.
- 5. Discord among the States.
- 6. Convention to amend.
  - 1. Of 1786.
  - 2. Of 1787.
- 7. Adoption of the Constitution.

First Division of Federal Government—Legislative.

II. THE FEDERAL GOVERNMENT.
- 1. *Constitution.*
  - 1. Preamble.
  - 2. Division into Houses.
    - 1. House of Representatives.
      - 1. Members.
      - 2. Qualifications.
      - 3. Number.
      - 4. Apportionment.
      - 5. Salary.
      - 6. Freedom from arrest.
    - 2. Senate.
      - 1. Character.
      - 2. Number of members.
      - 3. Qualifications.
      - 4. Election.
      - 5. Term.
      - 6. Salary.
  - 3. Congress in general.
    - 1. Officers.
    - 2. Impeachment.
    - 3. Meetings.
    - 4. Rules.
    - 5. Liberty of speech.
    - 6. Bills.
    - 7. Veto.
- 2. *Powers to tax.*
  - 1. Necessity for taxing.
  - 2. Manner of taxing.
  - 3. Object of taxing.
  - 4. Uniform system.
  - 5. Can borrow money.
- 3. *Regulation of Commerce.*
  - 1. Nature of regulation.
  - 2. Protection.
  - 3. Collection of Duties.
  - 4. Registry of Vessels.

II. The Federal Government.
- 3. *Regulation of Commerce.*
  - 5. Clearance and Equity
  - 6. Navigation Laws.
  - 7. Among the States.
  - 8. Among the Indians.
- 4. *Powers relating to Peace.*
  - 1. To naturalize Aliens.
  - 2. To pass Bankrupt Laws.
  - 3. To coin Money.
  - 4. To regulate Weights and Measures.
  - 5. To establish Post-Offices.
  - 6. To protect Inventors and Authors.
    - 1. In Patents.
    - 2. Copyrights.
  - 7. To establish courts.
  - 8. To punish Piracy.
  - 9. To punish offences against the laws of nations.
  - 10. Rights over the District of Columbia.
- 5. *Powers relating to War.*
  - 1. To declare war.
  - 2. To grant Letters of Marque, etc.
  - 3. Powers over captures.
  - 4. Powers to raise and maintain an Army and Navy.
  - 5. To call out the militia.
- 6. *Constitutional Prohibitions.*
  - 1. On the United States.
    - 1. As to Taxes.
    - 2. As to Commerce.
    - 3. Suspension of Habeas Corpus.
    - 4. Bills of Attainder.
    - 5. Ex post Facto laws.
    - 6. Titles of Nobility.
    - 7. Can't pay money unless appropriated.
    - 8. Officers can't wear titles of honor from foreign nations.
  - 2. On the States.
    - 1. As to Taxes.
    - 2. As to forming agreements with other States and nations.
    - 3. As to War.
    - 4. As to Money.
    - 5. As to Bills of Attainder.
    - 6. As to Ex post Facto laws.
    - 7. As to impair contracts.
    - 8. As to titles of nobility.

Second Division of Federal Government—Executive.

I. THE PRESIDENT.
- 1. *Qualifications.*
- 2. *Manner of election.* — 1. By Electors. 2. By the House.
- 3. *Length of term.*
- 4. *Vacancy.*
- 5. *Salary.*
- 6. *Powers.*
  1. Commander-in-Chief.
  2. To grant Reprieves and Pardons.
  3. To form Treaties.
  4. To appoint Ministers.
  5. To appoint Consuls.
  6. To appoint Judges.
  7. To appoint other Officers.
  8. To fill Vacancies.
  9. To remove Officers.
  10. To convene Congress.
  11. To receive foreign Ministers.
  12. To execute the laws.
  13. To deliver an Annual Message.
- 7. *His Cabinet.*
  1. Secretary of State.
  2. Secretary of Treasury.
  3. Secretary of Interior.
  4. Secretary of War.
  5. Secretary of Navy.
  6. Attorney-General.
  7. Postmaster-General.

Third Division of Federal Government—Judicial.

I. COURTS.
- 1. *Supreme.* — 1. Number. 2. Jurisdiction.
- 2. *Circuit.* — 1. Number. 2. Jurisdiction.
- 3. *District.* — 1. Number. 2. Jurisdiction.
- 4. *Court of Claims.*
- 5. *Judges of Courts.* — 1. Tenure of Office. 2. Salary.
- 6. *Jurisdiction in general.*
  1. Cases arising under Constitution and Treaties.
  2. Cases affecting Foreigners.
  3. Cases between different States.

II. CRIMES.
1. Treason.
2. Punishment.
3. Piracy.
4. Perjury.
5. Counterfeiting.
6. Forgery.
7. Mail robbery.
8. Slave holding.
9. Intimidating persons from exercising their Civil and Political rights.

IV. MISCELLANEOUS PROVISIONS OF THE CONSTITUTION.
1. Privileges of Citizens.
2. Pertaining to Fugitive Criminals.
3. Relating to new States.
4. Relating to Territories.
5. State Protection.

V. SUPREMACY OF THE NATIONAL LAW, OATH OF ALLEGIANCE, AND TEST OATH.

VI. CONSTITUTIONAL AMENDMENTS.
Art. I. Constitutional Amendments.
1. Freedom of Religion.
2. Freedom of Speech.
3. Freedom of Press.
4. Right of Petition.
Art. II. Right to keep arms.
Art. III. Quartering of Soldiers.
Art. IV. Search Warrants.
Art. V. and VI. Criminal Proceedings.
Art. VII. Trial by Jury.
Art. VIII. Excessive punishment.
Art. IX. Rights, of people, not named.
Art. X. Powers reserved to States.
Art. XI. Suits against States.
Art. XII. Election of President and Vice-President.
Art. XIII. Abolition of Slavery.
Art. XIV.
1. Apportionment of Representatives.
2. Political Disabilities.
3. Public Debt.
4. Powers of Congress.
5. Civil Rights.
Art. XV. Right of suffrage for freedmen.

CHAPTER VI.—PRINCIPLES OF LAW.

First. MUNICIPAL LAW.

I. CIVIL RIGHTS.
1. *Absolute.*
1. Personal security.
2. Personal liberty.
3. Private property.
1. Slander.
2. Libel.
2. *Relative.*
1. Public.
2. Private.
1. Duties of Parents.
2. Rights of Parents.
3. Rights of Children.
4. Apprentices.
5. Master and Servant.
6. Husband and Wife.

II. CONTRACT.
1. *Powers of persons to contract.*
1. Infancy.
2. Lunacy.
3. Married women.
4. Assent of parties.

- II. CONTRACT.
  - 1. *Powers of persons to contract.*
    - 5. Consideration.
    - 6. Fraud and force.
    - 7. Imperishable Contracts.
    - 8. Illegal Contracts.
    - 9. Written Contracts.
    - 10. Limitations to Contracts.
    - 11. Remedies to Contracts.
  - 2. *Marriage Contract.*
    - 1. Relationship.
    - 2. Lunacy.
    - 3. Fraud.
    - 4. Force.
    - 5. Ceremony.
    - 6. Bigamy.
    - 7. Wife's property.
    - 8. Dower.
    - 9. Support.
    - 10. Divorce.
- III. PRINCIPAL AND AGENT.
  - 1. Who is agent.
  - 2. Acts of agent.
  - 3. Wrongs of agent.
  - 4. Agent's duty to principal.
  - 5. Irresponsibility to third party.
  - 6. Commission Agent.
  - 7. Brokers.
- IV. PARTNERSHIP.
  - 1. Acts of either partner.
  - 2. Secret Partners.
  - 3. Transfer of interest.
  - 4. Terms of partnership.
  - 5. Notice when dissolved.
  - 6. Limited Partnership.
  - 7. Rights of Partners.
- V. SALE OF PROPERTY.
  - 1. There must be property.
  - 2. There must be an agreement.
  - 3. There must be a Delivery.
  - 4. There must be a Contract.
  - 5. Void without a Title.
  - 6. Title Warranted.
- VI. FRAUDULENT TRANSFER.
  - 1. Gifts.
  - 2. Creditors' rights.
  - 3. Record of Mortgages.
  - 4. Transfer of property to Creditors.
- VII. BILLS AND NOTES.
  - 1. *Promissory Notes.*
  - 2. *Bills of Exchange.*
    - 1. Use of Bills.
    - 2. Acceptance.
    - 3. Checks.
    - 4. Drafts.
    - 5. Endorsement.
  - 3. *Bills of Contract.*
    - 1. Negotiable.
    - 2. Can't be transferred without consent, after maturity.
  - 4. *Interest on notes.*
  - 5. *Time of payment.*
  - 6. *Days of grace.*
  - 7. *Indorser liable.*

VII. Bills and notes.
- 8. *Demand must be made.*
- 9. *Indorser must be notified.*

VIII. Services.
- 1. *Of Various Kinds.*
  - 1. Hotel keepers.
  - 2. Ordinary laborers.
  - 3. Common Carriers.
    - 1. Responsible to Persons.
    - 2. Responsible for Property.

IX. Insurance.
- 1. Fire.
- 2. Marine.
- 3. Life.
- 4. Several Policies.
- 5. False representations.

X. Shipping.
- 1. Bill of lading.
- 2. Goods destroyed to save balance.
- 3. Salvage.
- 4. Authority of ship-master.

XI. Interest.
- 1. Rate.
- 2. Usury.

XII. Real estate.
- 1. *Fee Simple.*
- 2. *Estate for life.*
- 3. *Contingent Estate.*
- 4. *Leased Estates.*
- 5. *Estates in trust.*
- 6. *Deeds and Mortgages.*
  - 1. A Deed.
  - 2. A Mortgage.
  - 3. Delivery.
  - 4. Recording.
  - 5. Acknowledgment.
  - 6. Foreclosure.
- 7. *Appurtenances.*
  - 1. Rights over highway.
  - 2. Rights over streams.
  - 3. Rights of way.
  - 4. Rights of party walls.
  - 5. Forfeiture of rights.

XIII. Landlord and tenant.
- 1. Lease.
- 2. Rent.
- 3. Distribution of property.
- 4. Removal of tenant.
- 5. Sale of property.
- 6. Repairs.
- 7. Crops.
- 8. Tenant may re-rent.
- 9. Notice to yield up premises.

XIV. Wills.
- 1. Who can make them.
- 2. Must be according to law.
- 3. How revoked.
- 4. Codicil.

XV. Distribution of property without wills.
- 1. Personal.
- 2. Real Estate.

Second. Criminal Law and Crimes.

1. What constitutes a crime.
2. Laws in different States.
3. Capital punishment.
4. Treason.
5. Murder.
6. Arson.
7. Manslaughter.
8. Burglary.
9. Robbery.
10. Larceny.
11. Embezzlement.
12. Forgery.

13. Perjury.
14. Minor offences.
15. Principals in crime.
16. Accessories.
17. Arrests.
18. Punishments.

Third. INTERNATIONAL LAW.

1. *Sovereignty.*
2. *Dependent on each other.*
3. *Law of Nations.*
4. *Origin of law.*
5. *Enforcement of law.*
6. *Arbitration.*
7. *Treaties.*
8. *Observance, how enforced.*

9. *Rules of Peace.*
   1. Jurisdiction.
   2. Relation to travellers.
   3. Relation to Criminals.
   4. Not to interfere with others' affairs.
   5. To protect the weaker.
   6. Not to make treaties to infringe on others' rights.
   7. Ambassadors.
   8. Consuls.
   9. Reprisals.
   10. Embargo.

10. *Rules for War.*
   1. Cause for war.
   2. Object.
   3. Arbitration.
   4. Treaties of Alliance.

11. *Rights and Duties of Belligerents.*
   1. To cease intercourse.
   2. To notify strangers to leave.
   3. To use instruments of death.
   4. To rights, etc., of Prisoners.
   5. Must protect non-combatants.
   6. Duties, etc., relating to civil war.
   7. War at Sea.
   8. Regulations regarding privateering.
   9. Regulations relating to Prizes.
   10. Relating to time.
   11. Relating to the Treaty.

12. *Rights and Duties of Neutrals.*
   1. Must remain Neutral.
   2. Must prevent Privateering.
   3. May continue to trade.
   4. Regarding Contraband.
   5. Must submit to search.
   6. Must regard the Blockade.

SECTION XVIII.

ARITHMETIC.

CHAPTER I.—FUNDAMENTAL RULES, ETC.

I. Definition.
1. Problem.
2. Solution.
3. Explanation.
4. Principle.
5. Example.
6. Analysis
7. Rule.
8. Unit.
9. Number.
10. Figure.

II. Numbers.
1. *Concrete.*
2. *Abstract.*
3. *Prime.*
4. *Composite.*
5. *Integers.*
6. *Fractions.*
7. *Mixed.*
8. *Similar.*
9. *Dissimilar.*
10. *Simple.*
11. *Compound.*
12. *Denominate.*
   1. Simple.
   2. Compound.

III. Notation and Numeration.
1. *Write by Words.*
2. *Write by Figures.*
3. *Write by Letters.*
4. *Order of Units.*
5. *Value.*
6. *Period.*
7. *Principles.*
   1. Ten units of any order make one of the next higher.
   2. Removing a figure one place to the left, increases its value.
   3. Removing a figure one place to the right diminishes its value.
   4. The name and value of a figure depends upon the place it occupies.
   5. The absence of a figure or figures is denoted by ciphers.
8. *Rule.*

IV. Roman notation.
1. *Characters.*
2. *Letters.*
3. *Principles.*
   1. Repeating a letter repeats its value.
   2. A letter placed before one of greater value, their difference is required.
   3. A letter placed after one of greater value, their sum is required.

- IV. Roman Notation.
  - 3. *Principles.*
    4. A letter between two of greater value, the difference between it and their sum is required.
    5. A Dash over a letter increases the value one thousand fold.
- V. Addition.
  - 1. *Terms.*
    1. Addends.
    2. Sum.
  - 2. *Cases.*
    1. When the sum is less than Ten.
    2. When the sum is greater than Ten.
  - 3. *Principles.*
    1. Only similar numbers can be added.
    2. Only units of like orders can be added.
    3. The sum is equal to all the parts.
    4. The sum diminished by one or more parts is equal to all the other parts.
  - 4. *Signs.*
    1. Addition (Plus).
    2. Equality.
    3. Dollars.
  - 5. *Rule.*
  - 6. *Proof.*
- VI. Subtraction.
  - 1. *Terms.*
    1. Minuend.
    2. Subtrahend.
    3. Difference or Remainder.
  - 2. *Cases.*
    1. When all the figures in the Minuend are greater than the corresponding figures in the Subtrahend.
    2. When one or more figures of the Minuend are less than the corresponding figures in the Subtrahend.
  - 3. *Principles.*
    1. Only similar numbers can be subtracted.
    2. Only units of like orders can be subtracted.
    3. Subtraction is the reverse of Addition.
    4. The Minuend equals the Subtrahend Plus the Remainder.
    5. The Subtrahend equals the Minuend Minus the Remainder.
    6. The Remainder equals the Minuend Minus the Subtrahend.
  - 4. *Signs.*
    1. Of Subtraction (Minus).
    2. Of Equality.
    3. Of Dollars.
    4. The Parenthesis.
    5. The Vinculum.
  - 5. *Rule.*
  - 6. *Proof.*
- VII. Multiplication.
  - 1. *Terms.*
    1. Multiplicand.
    2. Multiplier.
    3. Product.
  - 2. *Cases.*
    1. When the Multiplier contains one figure.
    2. When the Multiplier contains more than one figure.
    3. To multiply by factors.
    4. When the Multiplier has ciphers to the right.

- VII. Multiplication.
  - 3. *Principles.*
    1. The Multiplicand may be either a Concrete or an Abstract Number.
    2. The Multiplier is always an abstract number.
    3. The Product is like the Multiplicand.
    4. The Product is numerically the same in whichever order the terms are multiplied.
    5. Multiplication is a concise method of Addition.
    6. The Multiplicand equals the Product divided by the Multiplier.
    7. The Multiplier equals the Product divided by the Multiplicand.
    8. The Product equals the Multiplicand into the Multiplier.
  - 4. *Signs.*
    1. Of Multiplication.
    2. Of Equality.
    3. Of Dollars.
    4. The Parenthesis.
    5. The Vinculum.
  - 5. *Rule.*
  - 6. *Proof.*
- VIII. Division.
  - 1. *Terms.*
    1. Dividend.
    2. Divisor.
    3. Quotient.
    4. Remainder.
  - 2. *Cases.*
    1. To Divide when the divisor contains only one figure (Short Division).
    2. To Divide when the divisor contains more than one figure (Long Division).
    3. To Divide into equal parts.
    4. To Divide by factors.
    5. To Divide when there are ciphers to the right of the divisor.
  - 3. *Principles.*
    1. Division is a concise method of Subtraction.
    2. Division is the reverse of Multiplication.
    3. The Dividend and Divisor must be similar or abstract numbers.
    4. The Quotient is an abstract number.
    5. The Remainder is like the true Dividend.
    6. The Dividend equals the Divisor into the Quotient plus the Remainder.
    7. The Divisor equals the Dividend minus the Remainder divided by the Quotient.
    8. The Quotient equals the Dividend divided by the Divisor.

- VIII. Division.
  - 3. *Principles.*
    - 9. Increase the Divisor diminishes the Quotient.
    - 10. Diminish the Divisor increases the Quotient.
  - 4. *Signs.*
    - 1. Of Division.
    - 2. Of Equality.
    - 3. Of Dollars.
    - 4. Parenthesis.
    - 5. Vinculum.
  - 5. *Rule.*
  - 6. *Proof.*

CHAPTER II.—DECIMAL FRACTIONS.

- I. Decimal Fractions.
  - 1. *Terms.*
    - 1. Point.
    - 2. Tenths.
    - 3. Hundredths, etc.
  - 2. *Kinds.*
    - 1. Pure.
    - 2. Mixed.
    - 3. Complex.
    - 4. Circulating.
    - 5. Pure Repetend.
  - 3. *Principles.*
    - 1. Changing the Point toward the right multiplies the Decimal.
    - 2. Changing the Point towards the left divides the Decimal.
    - 3. Placing a cipher between the Point and Decimal divides the Decimal.
    - 4. The Point always belongs between the Decimal and the Integer.
    - 5. Ciphers to the right of a Decimal do not affect the value.
  - 4. *Reduction.*
    - 1. Decimals to common fractions.
    - 2. Common fractions to Decimals.
  - 5. *Addition.*
    - 1. Point.
    - 2. Place.
    - 3. Rule.
  - 6. *Subtraction.*
    - 1. Point.
    - 2. Rule.
  - 7. *Multiplication.*
    - 1. Point.
    - 2. Rule.
  - 8. *Division.*
    - 1. Principles.
      - 1. When the Dividend and Divisor are alike, the Quotient is a whole number.
      - 2. The Dividend must contain as many decimal places as the Divisor.
      - 3. When the Divisor is a whole number, the Quotient is like the Dividend.
      - 4. The Quotient must contain as many decimal places as those in the Dividend exceed those in the Divisor.
    - 2. Rules.

I. DECIMAL FRACTIONS. 9. *Circulates.*
1. A common fraction to a Circulate.
2. A pure Circulate to a common fraction.
3. A mixed Circulate to a common fraction.

CHAPTER III.—UNITED STATES MONEY.

I. ADDITION.
II. SUBTRACTION.
III. MULTIPLICATION.
IV. DIVISION.
V. REDUCTION.
VI. RULES.
1. Of Addition.
2. Of Subtraction.
3. Of Multiplication.
4. Of Division.

VII. BILLS. 1. *Terms.*
1. Bill.
2. Account.
3. Debtor.
4. Creditor.

CHAPTER IV.—PROPERTIES OF NUMBERS.

I. FACTORING.
1. *Principles.*
1. Every number is equal to the product of its prime factors.
2. Every number is divisible by its prime factors or some product of them.
3. Every number is divisible *only* by its prime factors or some product of them.
4. Any number ending in 0, 2, 4, 6 or 8, is divisible by 2.
5. Any number ending in 0 or 5 is divisible by 5.

2. *Cases.*
1. To find the prime factors.
2. To find the several factors or divisors.

3. *Rule.*
3. To find the equal factors.

II. COMMON DIVISOR.
1. *Terms.*
1. Common Divisor.
2. Greatest Common Divisor.
3. Greatest Common Measure.

2. *Cases.*
1. First Method.
2. Second Method.

3. *Principles.*
4. *Rule.*
1. The product of all the common prime factors of two or more numbers is the Greatest Common Divisor.
2. A Common Divisor of two or more numbers is a Divisor of their sum, and also of their difference.

III. COMMON MULTIPLE.
- 1. *Terms.*
  - 1. A Multiple.
  - 2. A Common Multiple.
  - 3. Least Common Multiple.
- 2. *Cases.*
  - 1. First Method.
  - 2. Second Method.
- 3. *Principles.*
  - 1. A Multiple of a number must contain all the prime factors of that number.
  - 2. A Common Multiple of two or more numbers, must contain all the prime factors of each of them.
  - 3. The Least Common Multiple of two or more numbers must contain all the prime factors of each of them, and no other factor.
- 4. *Rule.*

IV. CANCELLATION.
- 1. *Principles.*
  - 1. Cancelling a factor in any number divides the number by that factor.
  - 2. Cancelling a factor in both Dividend and Divisor of a quantity does not alter the value.
- 2. *Rule.*

CHAPTER V.—FRACTIONS.

I. TERMS.
1. Numerator.
2. Denominator.

II. KINDS.
1. Simple ($\frac{1}{2}$).
2. Compound ($\frac{1}{2}$ of $\frac{3}{4}$).
3. Proper ($\frac{3}{4}$).
4. Improper ($\frac{3}{2}$).
5. Mixed ($2\frac{1}{2}$).
6. Complex $\left\{\frac{\frac{1}{2}}{\frac{4}{5}}\right\}$
7. Reciprocal (1 ÷ by the number).

III. PRINCIPLES.
1. Multiplying the Numerator by any number, multiplies the value.
2. Dividing the Numerator by any number, divides the value.
3. Multiplying the Denominator by any number, divides the value.
4. Dividing the Denominator by any number, multiplies the value.
5. Multiplying both terms by the same number, does not change the value.
6. Dividing both terms by the same number does not alter the value.

IV. REDUCTION.
1. Numbers to Fractions.
2. Fractions to Numbers.

- IV. Reduction.
  - 3. Compound to Simple.
  - 4. To higher terms.
  - 5. To lower terms.
  - 6. Dissimilar to Similar.
  - 7. The Greatest Common Divisor of Fractions.
  - 8. The Least Common Multiple of Fractions.
  - 9. Rules for these cases.
- V. Addition.—Rule.
- VI. Subtraction.—Rule.
- VII. Multiplication.
  - 1. *Cases.*
    - 1. A Fraction by a whole Number.
    - 2. A whole Number by a Fraction.
    - 3. A Fraction by a Fraction.
  - 2. *Principles.*
  - 3. *Rules.*
    - 1. A Fraction is multiplied by multiplying its Numerator.
    - 2. A Fraction is multiplied by dividing its Denominator.
- VIII. Division.
  - 1. *Cases.*
    - 1. A Fraction by a whole Number.
    - 2. A whole Number by a Fraction.
    - 3. A Fraction by a Fraction.
  - 2. *Principles.*
    - 1. A Fraction is divided when its Numerator is divided.
    - 2. A Fraction is divided when its Denominator is multiplied.
  - 3. *Rules.*
- IX. Relations of Numbers and Fractions.
  - 1. The relation of a Number to a Fraction.
  - 2. The relation of a Fraction to a Number.
  - 3. The relation of a Number to a Number.
  - 4. The relation of a Fraction to a Fraction.

CHAPTER VI.—DENOMINATE NUMBERS.

- I. Simple.
- II. Compound.
- III. Measures.
  - 1. Of Value.
  - 2. Weight.
  - 3. Length.
  - 4. Surface.
  - 5. Volume.
  - 6. Time.
  - 7. Angles and Circular; and, First, Value, see below.
- I. Value.
  - 1. *Money.*
    - 1. Coin.
    - 2. Paper Money.
    - 3. Currency.
    - 4. Mint.
    - 5. Bullion.
  - 2. *United States Money.*
    - 1. Table.
    - 2. Denominations.
    - 3. Symbols.
  - 3. *Sterling Money.*
    - 1. Table.
    - 2. Denominations.
    - 3. Symbols.
  - 4. *French Money.*
    - 1. Table.
    - 2. Denominations.
    - 3. Symbols.

- I. VALUE.
  - 5. *German Money.*
    - 1. Table.
    - 2. Denominations.
    - 3. Symbols.
- II. WEIGHT.
  - 1. *Troy.*
    - 1. Name.
    - 2. Use.
    - 3. Unit of measure.
    - 4. Caret.
    - 5. Table.
    - 6. Denominations.
    - 7. Symbols.
  - 2. *Apothecaries'.*
    - 1. Use.
    - 2. Unit of measure.
    - 3. Table.
    - 4. Denominations.
    - 5. Symbols.
    - 6. Apothecaries' Fluid.
  - 3. *Avoirdupois.*
    - 1. Name.
    - 2. Use.
    - 3. Unit of measure.
    - 4. Table.
    - 5. Denominations.
    - 6. Symbols.
  - 4. *Miscellaneous.*
    - 1. Cental.
    - 2. Cask.
    - 3. Quintal.
    - 4. Barrel of Flour.
    - 5. Barrel of Salt.
    - 6. Barrel of Pork.
- III. MISCELLANEOUS WEIGHTS.
  - 1. Of Wheat (60).
  - 2. Of Oats (32).
  - 3. Rye (56).
  - 4. Buckwheat (52).
  - 5. Potatoes (60).
  - 6. Beans (60).
  - 7. Clover Seed (60)
  - 8. Timothy Seed (45).
  - 9. Flax Seed (56).
  - 10. Barley (48).
  - 11. Corn in ear (70).
  - 12. Corn shelled (56).
  - 13. Salt (56).
  - 14. Bituminous Coal (70).
  - 15. Onions (57).
  - 16. Dried Apples (24).
  - 17. Dried Peaches (33).
  - 18. Hemp Seed (44).
- IV. LENGTH. 1. *Long Measure.*
  - 1. A Line.
  - 2. An Angle.
  - 3. A Right Angle.
  - 4. Its use.
  - 5. Unit of measure.
  - 6. Table.
  - 7. Denominations.
  - 8. Symbols.

- IV. Length.
  - 2. *Cloth Measure.*
    1. Use.
    2. Divisions.
  - 3. *Surveyors' Long.*
    1. Use.
    2. Unit of measure.
    3. Table.
    4. Denominations.
    5. Symbols.
  - 4. *Miscellaneous.*
    1. Fathoms.
    2. Cables' length.
    3. League.
    4. Hand.
    5. Cubit.
    6. Palm.
    7. Pace.
- V. Surface.
  - 1. *Square Measure.*
    1. Rectangle.
    2. Square.
    3. Area.
    4. Use.
    5. Unit of measure.
    6. Table.
    7. Denominations.
    8. Symbols.
    9. Surveyors' Square.
- VI. Volume and capacity.
  - 1. *Cubic Measure.*
    1. Use.
    2. Cube.
    3. Contents.
    4. Units of measure.
    5. Table.
    6. Denominations.
    7. Symbols.
    8. Cord.
    9. Cord feet.
  - 2. *Dry Measure.*
    1. Use.
    2. Unit of measure.
    3. Table.
    4. Denominations.
    5. Symbols.
    6. Cubic inches in Bushel.
       1. Heaped bu.
       2. Stroked bu.
  - 3. *Liquid Measure.*
    1. Use.
    2. Unit of measure.
    3. Table.
    4. Denominations.
    5. Symbols.
    6. Cubic inches in gallon.
- VII. Time.
  1. Use.
  2. Unit of measure.
  3. Table.
  4. Denominations.
  5. Symbols.
  6. Seasons.
  7. Names of months.

VIII. Angular or circular.
- 1. *Use.*
  - 1. Right.
  - 2. Acute.
  - 3. Obtuse.
- 2. *Angles.*
- 3. *Circle.*
- 4. *Circumference.*
- 5. *Diameter.*
- 6. *Table.*
- 7. *Denominations.*
- 8. *Symbols.*

IX. Miscellaneous.
- 1. *Counting.*
  - 1. Dozen.
  - 2. Gross.
  - 3. Great Gross.
  - 4. Pair.
  - 5. Set.
  - 6. Score.
- 2. *Paper.*
  - 1. Quire.
  - 2. Ream.
  - 3. Bundle.
  - 4. Bale.
- 3. *Books.*
  - 1. Folio.
  - 2. Quarto.
  - 3. Octavo.
  - 4. Duodecimo.
  - 5. 18mo.
  - 6. 24mo.
  - 7. 32mo.

IV. Reduction.
- 1. *Ascending.*
- 2. *Descending.*
- 3. *Rule.*
- 4. *Cases.*
  - 1. A Denominate Number to a Denominate Fraction.
  - 2. A Denominate Fraction to a Denominate Number.
  - 3. To find what part one is of another.

V. Addition.—Rule.[7]

VI. Subtraction.—Rule.

VII. Multiplication.—Rule.

VIII. Division.
- 1. Divide into parts.
- 2. One compound number by another.

IX. Longitude and time.
- 1. To find the difference in time.
- 2. To find the difference in longitude.

X. Denominate fractions.
- 1. *Common.*
  - 1. A Fraction to a Fraction of a lower denomination.
  - 2. A Fraction to an integer of a lower denomination.
  - 3. A Fraction to a Fraction of a higher denomination.
  - 4. A compound number to a Fraction.
- 2. *Decimals.*
  - 1. A Decimal to a Denominate Number.
  - 2. A Compound Number to a Decimal.

CHAPTER VII.—RATIO.

I. TERMS.
1. Antecedent.
2. Consequent.
3. Couplet.
4. Ratio.

II. KINDS.
1. Simple.
2. Compound.

III. PRINCIPLES.
1. A Ratio equals the Quotient of the Antecedent divided by the Consequent.
2. The Antecedent equals the product of the Consequent by the Ratio.
3. The Consequent equals the quotient of the Antecedent divided by the Ratio.

CHAPTER VIII.—PROPORTION.

I. SIMPLE.
II. COMPOUND.
III. PRINCIPLES.
1*st*. The product of the means equals the product of the extremes.
2*d*. Either extreme equals the product of the means divided by the other extreme.
3*d*. Either mean equals the product of the extremes divided by the other mean.
4*th*. The fourth term equals the third divided by the ratio of the first to the second.
5*th*. The first term equals the second multiplied by the ratio of the third to the fourth.
6*th*. The product of the simple ratios of the first couplet in a compound proportion, equals the product of the simple ratios of the second couplet.
7*th*. The product of all the terms in the extremes of a compound proportion, equals the product of all the terms in the means.
8*th*. Any term in either extreme in a compound proportion, equals the product of the means divided by the product of the other terms in the extremes.
9*th*. Any term in either mean in a compound proportion, equals the product of the extremes divided by the product of the other terms in the means.

CHAPTER IX.—PERCENTAGE.

I. TERMS.
1. Base.
2. Rate.
3. Percentage.
4. Am't or Difference.

II. CASES.
1. The Base and Rate given to find the Percentage.
2. The Percentage and Rate given to find the Base.
3. The Base and Percentage given to find the Rate.
4. The resulting number and Rate given to find the Base.

III. PRINCIPLES. IV. RULES.
1. The Percentage equals the Base multiplied by the Rate, divided by 100.
2. The Rate equals the Percentage divided by the Base, multiplied by 100.
3. The Base equals the Percentage divided by the Rate, multiplied by 100.
4. The Base equals the amount divided by one (1) plus the rate, or by (1) minus the Rate multiplied by 100.

V. APPLICATIONS AND
1. Gain and Loss.
2. Stocks and Dividends.
3. Premium and Discount.
4. Commission and Brokerage.
5. Insurance.
6. Simple Interest.
7. Compound Interest.
8. True Discount.
9. Banking.
10. Taxes.
11. Custom House business.
12. Direct Exchange.
13. Circular Exchange.

I. GAIN OR LOSS.
1. Capital and Rate given to find the gain or loss.
2. The Rate and gain or loss given to find the Base.
3. The Base and gain or loss given to find the Rate.
4. Rules.

II. STOCKS AND DIVIDENDS.
1. *Terms.*
1. A Company.
2. Corporation.
3. Stock.
4. Dividend.
5. Assessment.
2. *Cases.*
1. Stock and Rate given to find the Dividend.
2. Rate and Dividend given to find Stock.
3. *Rules.*
3. Stock and Dividend given to find Rate.

III. PREMIUM AND DISCOUNT.
1. *Terms.*
1. Capital.
2. Money.
3. Stocks.
4. Drafts and Checks.
5. Bills of Exchange.
6. Par Value.
7. Real Value.
8. Premium.
9. Discount.
2. *Cases.* 3. *Rules.*
1. The Par Value and Rate to find the Premium or Discount.
2. The Premium or Discount to find the Par Value.
3. The Par Value and Real Value or Discount to find the Rate.
4. The Real Value or Face and Rate to find the Premium or Discount.

- IV. COMMISSION AND BROKERAGE.
  - 1. *Terms.*
    1. Agent or Factor.
    2. Brokerage.
    3. A Broker.
  - 2. *Cases.*
  - 3. *Rules.*
    1. The Base and Rate to find Commission.
    2. The Commission or Brokerage, and Base, to find Rate.
    3. The Commission or Brokerage and Rate to find the Base or Cost.
    4. The Rate and Cost, or Base, to find Commission or Brokerage.
- V. INSURANCE.
  - 1. *Terms.*
    1. Insurance.
    2. Policy.
    3. Premium.
  - 2. *Cases.*
    1. Value and Rate given to find Premium.
    2. Value and Premium to find Rate.
  - 3. *Rule.*
    3. Rate and Premium to find Value.
- VI. SIMPLE INTEREST.
  - 1. *Terms.*
    1. Interest.
    2. Rate.
    3. Principal.
    4. Time.
    5. Amount.
    6. Legal interest.
  - 2. *Cases.*
    1. Principal, Rate and Time, to find Interest, or Amount.
    2. Principal, Rate and Interest, to find Time.
  - 3. *Rules.*
    3. Principal, Time and Interest, to find Rate.
    4. Time, Rate and Interest, to find Principal.
  - 4. *Interest on Notes.*
    1. Promissory Note.
    2. Judgment Note.
    3. Drawer.
    4. Payee.
    5. Endorser.
    6. Indorsements.
    7. Rules.
- VII. COMPOUND INTEREST.—Rules.
- VIII. TRUE DISCOUNT.
  1. Discount.
  2. Present Worth.
  3. Rules.
- IX. BANKING.
  - 1. *Terms.*
    1. Proceeds.
    2. Discount.
    3. Bank Discount.
    4. Days of Grace.
  - 2. *Cases.*
    1. The face of a note, Rate and Time, to find the Discount and Proceeds.
  - 3. *Rule.*
    2. Proceeds, Rate and Time, to find face.
- X. TAXES.
  1. Property.
  2. Poll.
  3. Rule.
- XI. CUSTOM HOUSE BUSINESS.
  1. Duties.
  2. Customs.
  3. Ad Valorem Duty.
  4. Specific Duty.
  5. Draft.
  6. Tare.
  7. Gross Weight.
  8. Rule.

XII. DIRECT EXCHANGE.
- 1. *Terms.* — 1. Bills of Exchange.
  - 1. Draft.
  - 2. Notes.
  - 3. Checks.
  - 4. Sight Bill.
  - 5. Time Bill.
  - 6. Indorsement.
  - 7. Acceptance.
- 2. *Inland Exchange.*
- 3. *Foreign Exchange.*
- 4. *Cases.*
- 5. *Rules.*
  - 1. To find the cost of a Bill at sight.
  - 2. The cost of a Bill given to find face.

XIII. CIRCULAR EXCHANGE.—Rule.

XIV. PARTNERSHIP.
- 1. Simple.
- 2. Compound.
- 3. Rules.

XV. EQUATION OF PAYMENTS.
- 1. *Average time of payment.*
- 2. *Equated time of payment.*
- 3. *Cases.*
  - 1. When terms of credit begin at the same time.
  - 2. When the debt has received partial payments, to find time for payment of the remainder.
  - 3. When credit begins at different times.
  - 4. To average accounts of both debt and credit.
- 4. *Rule.*

XVI. SETTLEMENT OF ACCOUNTS.
- 1. Current accounts.
- 2. Settling or clearing.
- 3. Rule.

CHAPTER X.—ALLIGATION.

I. ALLIGATION MEDIAL.

II. ALLIGATION ALTERNATE.

III. CASES.
IV. RULE.
- 1. Given the mean value and value of each, to find the proportion of each.
- 2. Given the mean value, the value of each, and quantity of one, to find the others.
- 3. Given the mean value, the value of each, and the entire quantity, to find quantity of each.

CHAPTER XI.—PROGRESSION.

I. ARITHMETICAL.
- 1. First Term.
- 2. Last Term.
- 3. Common difference.
- 4. Number of terms.
- 5. Sum of terms.

- II. Geometrical.
  - 1. First Term.
  - 2. Last Term.
  - 3. Number of terms.
  - 4. Ratio.
  - 5. Sum of terms.
- III. Rule.
- IV. Infinite series.

CHAPTER XII.—INVOLUTION AND EVOLUTION.

- I. Involution.
  - 1. *Terms.*
    - 1. Power.
    - 2. Degree.
    - 3. Exponent.
  - 2. *Principles.*
    1. The square of a number contains twice as many figures as the number, or twice as many less one.
    2. The cube of a number contains three times as many figures as the number, or three times less one or two.
    3. The square of a number of tens and units equals the square of the tens, plus twice the tens into the units, plus the square of the units.
    4. The square of a number of hundreds, tens and units, equals the square of the hundreds, plus two times the hundreds into the tens, plus the square of the tens, plus two times the sum of the hundreds and tens into the units, plus the square of the units.
    5. The cube of a number of tens and units equals the cube of the tens, plus three times the square of the tens into the units, plus three times the tens into the square of the units, plus the cube of the units.
    6. The cube of a number of hundreds, tens and units, equals the cube of the hundreds, plus three times the square of the hundreds into the tens, plus three times the hundreds into the square of the tens, plus the cube of the tens, plus three times the square of the sum of the hundreds and tens into the units, plus three times the sum of the hundreds and tens into the square of the units, plus the cube of the units.
- II. Evolution.
  - 1. *Terms.*
    1. Square Root.
    2. Cube Root.
    3. Fourth Root.
    4. Sign.

II. Evolution.
- 2. *Analytic method of Square Root.*
- 3. *Rule.*
- 4. *Applications of Square Root.*
  - 1. Right-angled Triangle.
    - 1. The square of the hypotenuse equals the sum of the squares of the other two sides.
    - 2. The square of either side equals the square of the hypotenuse diminished by the square of the other side.
  - 2. Similar surfaces.
    - 1. The areas of circles are as the squares of their Diameters, Radii, or Circumferences.
    - 2. The areas of squares, similar Rectangles, and Triangles, are to each other as the squares of their like dimensions.
- 5. *Analytic method of Cube Root.*—Rule.
- 6. *Applications of Cube Root.*
  - 1. Similar volumes are to each other as the cubes of their like dimensions.
  - 2. The like dimensions of similar volumes are to each other as the cube roots of the volumes.
- 7. *Geometrical method of Cube Root.*

CHAPTER XIII.—ANNUITIES AND MENSURATION.

I. Annuities.
1. To find the amount at Simple Interest.
2. To find the amount at Compound Interest.
3. To find the present value at Simple Interest.
4. To find the present value at Compound Interest.

II. Mensuration.
- 1. *Terms.*
  1. Angle.
  2. Right Angle.
  3. Acute Angle.
  4. Obtuse Angle.
  5. Triangle.
     1. Base.
     2. Altitude.
     3. Hypotenuse.
  6. Polygon.
  7. Scalene.
  8. Isosceles.
- 2. *Principle.* The Area of a Triangle is equal to the Base multiplied by one-half the Altitude.

II. MENSURATION. 3. *Quadrilateral.*
- 1. Parallelogram.
  - 1. Rectangle.
  - 2. Square.
  - 3. Rhomboid.
  - 4. Rhombus.
- 2. Trapezoid.
- 3. Trapezium.
- 4. Principles (see below):

1. The area of a Parallelogram equals the Base multiplied by the Altitude.
2. The area of a Trapezoid equals the Altitude multiplied by one-half the sum of the Parallel sides.
3. The area of a Trapezium equals the sum of the areas of the two triangles into which it may be divided.

III. THE CIRCLE.
1. The area of a circle equals the Square of the Radius by 3.1416.
2. The Circumference of a circle equals the Diameter multiplied by 3.1416.
3. The Diameter of a circle is equal to the Product of the Circumference by .3183.
4. The side of any square that can be inscribed in a circle, equals the Product of the Diameter by .7017106 or the Product of the Circumference by .225079.
5. The area of an ellipse equals the Product of one-half the two axes together, and that Product multiplied by 3.1416.

IV. VOLUMES.
1. *Prism.*
   1. The convex surface of a prism equals the Perimeter of the Base multiplied by the Altitude.
   2. The contents of a Prism equals the Product of the area of the Base by the Altitude.
2. *Pyramid.*
   1. The convex surface of a Pyramid equals the Product of the Perimeter of the Base by one-half the slant height.
   2. The contents of a Pyramid equals the Product of the area of Base by one-third of the Altitude.
3. *Cylinder.*
   1. The surface of a Cylinder equals the Product of the Circumference of the Base by the Altitude.
   2. The contents of a Cylinder equals the Product of the area of the Base by the Altitude.
4. *Cone.*
   1. The surface of a Cone equals the Product of the Circumference of Base by one-half the slant height.
   2. The contents of a Cone equals the Product of the area of the Base by one-third of Altitude.
5. *Frustrum of a Pyramid and Cone.*
   1. The convex surface of the Frustrum of a Pyramid and Cone equals the sum of the Perimeters of the two Bases, multiplied by one-half the slant height.

IV. VOLUMES.

5. *Frustrum of a Pyramid and Cone.*

2. The contents of a Frustrum is equal to the Square Root of the product of the two Bases, plus the *sum* of the Bases, multiplied by one-third of the Altitude.

V. THE SPHERE.

1. The surface of a sphere equals the square of the Radius multiplied by 4 and that Product by 3.1416.
2. The contents of a sphere equals the cube of the Diameter multiplied by .5236.
3. The size of any cube which may be cut from a sphere equals the square root extracted from the Quotient of the Square of the Diameter divided by 3.

SECTION XIX.

ALGEBRA.

CHAPTER I.—DEFINITIONS, ETC.

I. QUANTITY.
II. COEFFICIENT.
III. EXPONENT.
IV. POWER.
V. ROOT.
- 1. Measure.
- 2. Currency.
- 3. Length.
- 4. Surface.
- 5. Volume.
- 6. Weight.
- 7. Time.
- 8. Angular measure.
- 9. Known Quantity.
- 10. Unknown Quantity.
- 11. Literal.
- 12. Numeral.

VI. EQUATION.
- 1. First member.
- 2. Second member.

VII. MONOMIAL.
VIII. POLYNOMIAL.
IX. BINOMIAL.
X. TRINOMIAL.
XI. RESIDUAL.
XII. HOMOGENEOUS.
XIII. RECIPROCAL.

XIV. TERMS.
- 1. Positive.
- 2. Negative.
- 3. Similar.
- 4. Dissimilar.
- 5. Degree.

XV. SIGNS.
- 1. *Addition.*
- 2. *Subtraction.*
- 3. *Multiplication.*
- 4. *Division.*
- 5. *Equality.*
- 6. *Inequality.*
- 7. *Radical.*
- 8. *Parenthesis.*
- 9. *Vinculum.* (1. Horizontal. 2. Vertical.)
- 10. *Brackets.*

XVI. AXIOMS.
- 1. The same quantity added to equals, their sum will be equal.
- 2. The same quantity subtracted from equals, their difference will be equal.

XVI. AXIOMS.

3. If quantities be multiplied by the same number, their product will be equal.
4. If equals be divided by the same quantity, their quotients will be equal.
5. If the same quantity be both added to and subtracted from a quantity, their value will not be changed.
6. If a quantity be both multiplied and divided by the same number, the value will be the same.
7. Quantities equal to any other quantity, are equal to each other.
8. Like powers of equal quantities are equal.
9. Like roots of equal quantities are equal.
10. The whole of any quantity is equal to all of its parts.
11. The whole of any quantity is more than any of its parts.

CHAPTER II.—ENTIRE QUANTITIES.

I. ADDITION.

1. *Cases.* 1. Similar Terms. 2. Polynomials.
2. *Principles.* 1. Only similar terms can be added. 2. The sum of all the parts equals the whole.
3. *Sign.*
4. *Rule.*

II. SUBTRACTION.

1. *Cases.* 1. Only similar quantities can be subtracted. 2. Polynomials.
2. *Principles.* 1. The same number added to both Minuend and Subtrahend, does not change the value. 2. The same number subtracted from both, does not change the value.
3. *Sign.* 3. The Minuend equals the Subtrahend plus the Remainder.
4. *Rule.* 4. The Subtrahend equals the Minuend minus the Remainder.

III. MULTIPLICATION.

1. *Cases.* 1. When both factors are Monomials. 2. When one factor is a Polynomial. 3. When both factors are Polynomials. 4. To square a Binomial. 5. To find the Product of the sum and difference of two quantities.
2. *Principles.* 1. Both factors multiplied by the same does not change the Product. 2. Both divided by the same does not change it. 3. The same quantity added to, or subtracted from both, does not change the Product.

III. MULTIPLICATION.
- 2. *Principles.*
  - 4. Multiplying the Multiplier by a quantity multiplies the Product by that quantity.
  - 5. Dividing the Multiplicand by a quantity divides the Product by that quantity.
  - 6. The Multiplicand equals the Multiplier divided into the Product.
  - 7. The Multiplier equals the Product divided by the Multiplicand.
  - 8. The Product is of the same quantity as the Multiplicand.
- 3. *Sign.*
- 4. *Rules.*

IV. DIVISION.
- 1. *Cases.*
  - 1. When both terms are Monomials.
  - 2. When one term is a Monomial.
  - 3. When both terms are Polynomials.
  - 4. When one term is a Polynomial.
- 2. *Principles.*
  - 1. Multiplying the Dividend multiplies the Quotient.
  - 2. Multiplying the Divisor divides the Quotient.
  - 3. Dividing the Divisor multiplies the Quotient.
  - 4. Multiplying and dividing both Dividend and Divisor does not change the Quotient.
  - 5. The Dividend equals the Divisor into the Quotient plus the Remainder.
  - 6. The Divisor equals the Dividend divided by the Quotient.
  - 7. The Quotient is of the same quantity as the Dividend.
  - 8. The Remainder is of the same quantity as the Dividend.
- 3. *Sign.*
- 4. *Rules.*

V. FORMULAS:

1*st Formula.*—The square of the sum of any two quantities is equal to the square of first, plus twice the first multiplied by the second, plus the square of the second.

2*d Formula.*—The square of the difference between any two quantities, is equal to the square of first, minus twice the Product of the second by the first, plus the square of the second.

3*d Formula.*—The sum of two quantities multiplied by their difference, equals the difference of their squares.

4*th Formula.*—The sum of the squares of any two quantities, plus twice their Product, is divisible by their sum.

5*th Formula.*—The sum of the squares of any two quantities, minus twice their Product, is divisible by the difference of the quantities.

VI. FACTORING.
- 1. *Cases.*
  - 1. Monomials.
  - 2. Polynomials.
  - 3. Trinomials.
  - 4. Binomials.
- 2. *Rules.*

VII. COMMON DIVISOR.
- 1. *Cases.*
  - 1. Common Divisor.
  - 2. Greatest Common Divisor.
- 2. *Principle.* — The Greatest Common Divisor of two or more quantities, is the Product of all their common prime factors.
- 3. *Rule.*

VIII. MULTIPLE.
- 1. *Cases.*
  - 1. Multiples, Common.
  - 2. Multiples, Least Common.
- 2. *Principles.*
  1. The Common Multiple of two or more quantities, is the Product of all their prime factors.
  2. The Least Common Multiple of two or more quantities is the Product of all their prime factors, and no other.
- 3. *Rule.*

CHAPTER III.—FRACTIONS.

I. TERMS.
1. Denominator.
2. Numerator.
3. Fraction.

II. SIGN.
1. Apparent.
2. Real.

III. KINDS.
1. Mixed Quantity.
2. Simple.
3. Complex.

IV. PRINCIPLES OF FRACTIONS:

1*st Principle.*—Any change in the Numerator produces a similar change in value.

2*d Principle.*—Any change in the Denominator produces an opposite change in value.

3*d Principle.*—Changing the sign of the Numerator, changes the real sign of the fraction.

4*th Principle.*—Changing the sign of both Denominator and Numerator, does not alter the real sign.

5*th Principle.*—Changing the apparent sign changes the real sign.

V. TRANSFORMATION:

1*st Transformation.*—To reduce an entire quantity to a fractional form.

2*d Transformation.*—To reduce a Fraction to its lowest terms.

3*d Transformation.*—To reduce a Fraction to a Mixed Quantity.

4*th Transformation.*—To reduce a Mixed Quantity to a fractional form.

5*th Transformation.*—To reduce Fractions to a Least Common Denominator.

6*th Transformation.*—To reduce Fractions of different Denominators to similar Fractions.

VI. ADDITION.

VII. SUBTRACTION.

VIII. MULTIPLICATION.
1. An entire quantity by a Fraction.
2. A Fraction by an entire quantity.
3. A Fraction by a Fraction.

IX. DIVISION.
1. A Fraction by an entire quantity.
2. An entire quantity by a Fraction.
3. A Fraction by a Fraction.

X. RULES.
1. For Transformation.
2. For Addition.
3. For Subtraction.
4. For Multiplication.
5. For Division.

CHAPTER IV.—EQUATIONS.

I. TERMS.
1. First term.
2. Second term.
3. Arithmetical.

II. KINDS OF EQUATIONS.
1. *Arithmetical equation.*
2. *Algebraic equation.*
3. *Numeral equation.*
4. *Literal equation.*
5. *Identical equation.*
6. *Simple equation.*
7. *Quadratic equation.*
8. *Cube.*
9. *Degree.*
   1. First equation.
   2. Second equation.
   3. Third equation.

III. TRANSFORMATION.
1. *Clearing of fractions.*
   1. Clear of fractions.
   2. Transpose.
   3. Unite the terms.
   4. Divide,
   5. Verify.
2. *Transposing.*
3. *Solving equations.*

IV. PROBLEMS IN EQUATIONS.
1. *Statement.*
2. *Solution.*
   1. Translate.
   2. Solve.

V. AXIOMS (see Axioms on pp. 125, 126, ante).

VI. EQUATIONS OF TWO OR MORE UNKNOWN QUANTITIES.
1. *Elimination.*
   1. By Substitution.
   2. By Comparison.
   3. By Addition.
   4. By Subtraction.

VII. RULES.

CHAPTER V.—POWERS AND ROOTS.

I. POWERS.
1. *Terms.*
   1. Power.
   2. Square.
   3. Cube.
   4. Perfect power.
   5. Imperfect.
   6. Involution.
2. *Powers of Monomials.*
3. *Powers of Fractions.*
4. *Powers of Binomials.*
   1. The number of terms.
   2. The Sign of terms.
   3. The Exponents of the letters.
   4. The Coefficients of the Terms.
   5. The Law of Coefficients (see below):

The Coefficient of any term may be obtained by multiplying the Coefficient of the preceding term by the Exponent of the leading quantity in that term, or by the number of the term from the last, and by the Coefficient of the following quantity in the root, and dividing this result by the product of the Coefficient of the leading quantity in the root, multiplied by the number of term from the first.

II. ROOTS.
- 1. *Terms.*
  - 1. Evolution.
  - 2. Root.
  - 3. Index.
  - 4. Surd.
- 2. *Roots of Monomials.*
- 3. *Roots of Polynomials.*
- 4. *Square Root.*
- 5. *Cube Root.*
- 6. *Principles.*

CHAPTER VI.—RADICALS.

I. REDUCTION.
1. To its simplest form.
2. A Rational to a Radical.
3. Of different degrees to a common Radical Index.

II. ADDITION OF RADICALS.

III. SUBTRACTION OF RADICALS.

IV. MULTIPLICATION OF RADICALS.
1. Of same degree.
2. Of different degrees.

V. DIVISION OF RADICALS.
1. Of same degree.
2. Of different degree.

VI. RULES FOR RADICALS.
1. *For Reduction.*
2. *For Addition.*
3. *For Subtraction.*
4. *For Multiplication.*
5. *For Division.*

(See any text book for Rules.)

VII. PRINCIPLES OF INVOLUTION AND EVOLUTION:

1st Principle of Involution.—If a radical quantity be involved to a power corresponding to the Radical Index, the Radical sign will be removed.

2d Principle of Involution.—If a quantity containing both radical and rational terms be raised to any power, the Radical sign will remain.

3d Principle of Involution.—If a quantity consisting of two radical terms of the second degree be squared, the result will contain but a single radical term.

1st Principle of Evolution.—The Exponent of a quantity will be removed by extracting the root whose index corresponds to the Exponent.

2d Principle of Evolution.—The root of a Binomial is necessarily a Surd, and a Binomial always becomes a Radical by Evolution.

3d Principle of Evolution.—A Trinomial is a perfect square when two of its terms are perfect squares and Positive, and the remaining term is twice the product of the square roots of the others, and either Positive or Negative.

VIII. EQUATIONS CONTAINING RADICAL QUANTITIES.

IX. RULES FOR EQUATIONS IN RADICALS.

CHAPTER VII.—QUADRATICS AND PROGRESSION.

First.—QUADRATICS.

- I. TERMS.
  1. Pure.
  2. Affected.
  3. Roots.
- II. PROBLEMS.
  1. *In pure.*
  2. *In affected.*
     1. First method.
     2. Second method.
- III. EQUATIONS.
  1. Complete the square.
  2. Extract the root.
  3. Transpose.
- IV. POLYNOMIALS.
  4. Unite the terms.
  5. Extract the root.
- V. FACTORING TRINOMIALS.

Second.—PROGRESSION.

- I. ARITHMETICAL.
  1. *Extremes.*
  2. *Means.*
  3. *Terms.*
  4. *Cases.*
     1. To find the last term.
     2. To find the sum of the series.
  5. *Applications.*
     1. First term.
     2. Common difference.
     3. Number of terms.
     4. Last term.
     5. Sum of terms.
     6. Formulas.
     7. Problems.
     8. Rule.
- II. GEOMETRICAL.
  1. *Ascending.*
  2. *Descending.*
  3. *Ratio.*
  4. *Cases.*
     1. To find the last term.
     2. To find the sum of the Series.
  5. *Infinite Series.*
  6. *Geometrical means.*
  7. *Applications.*
     1. First term.
     2. Ratio.
     3. Number of terms.
     4. Last term.
     5. Sum of terms.
  8. *Problems.*
  9. *Rule.*

SECTION XX.

GEOMETRY.

CHAPTER I.—TERMS USED AND LANGUAGE OF GEOMETRY.

- I. Lines and angles.
  - 1. *Magnitude.*
  - 2. *Point.*
  - 3. *Line.*
    - 1. Straight.
    - 2. Curved.
    - 3. Crooked.
    - 4. Parallel.
    - 5. Horizontal.
    - 6. Vertical.
    - 7. Oblique.
  - 4. *Surface.*
  - 5. *Plane.*
  - 6. *Volume.*
  - 7. *Angles.*
    - 1. Plane.
    - 2. Adjacent.
    - 3. Right angle.
    - 4. Acute angle.
    - 5. Obtuse angle.
    - 6. Triangle.
      - 1. Scalene.
      - 2. Equilateral.
      - 3. Right angle.
      - 4. Acute angle.
      - 5. Obtuse angle.
      - 6. Isosceles angle.
    - 7. Interior angle.
    - 8. Exterior angle.
- II. Plane figures.
  - 1. *Polygon.*
    - 1. Quadrilateral.
    - 2. Pentagon.
    - 3. Hexagon.
    - 4. Heptagon.
    - 5. Octagon.
    - 6. Nonagon.
    - 7. Decagon.
  - 2. *Quadrilateral.*
    - 1. Trapezium.
    - 2. Trapezoid.
    - 3. Parallelogram.
  - 3. *Rectangle.*
    - 1. Square.
    - 2. Rhomboid.
    - 3. Rhombus.
  - 4. *Circle.*
    - 1. Circumference.
    - 2. Diameter.
    - 3. Radius.
- III. Axioms.
  1. Things which equal the same things, equal each other.
  2. Equals added to equals, the sum will be equal.
  3. Equals subtracted from equals, the Remainder will be equal.
  4. Equals added to unequals, the sum will be unequal.
  5. Equals subtracted from unequals, the Remainder will be unequal.
  6. If equals be multiplied by equals the Product will be equal.

III. AXIOMS. { 7. If equals be divided by equals the Quotient will be equal.
8. The whole is greater than any of its parts.
9. The whole is equal to all of its parts.

IV. COROLLARY.
V. SCHOLIUM.
VI. PROBLEMS.
VII. POSTULATE.
VIII. HYPOTHESIS.
IX. THEOREMS, AND—

1. *Of Angles.*

1st. When any straight line meets another, the sum of the two adjacent angles equals two right angles.
2d. When two straight lines intersect each other, the opposite, or vertical angles, are equal.
3d. Two angles which have their sides respectively parallel, and lying in the same direction, or in opposite directions, are equal.
4th. If two triangles have two sides, and the included angle of the one equal to two sides and the included angle of the other, each to each, the triangles will be equal in all their parts.
5th. If two triangles have two angles, and the included side of the one equal to two angles and the included side of the other, each to each, the triangles will be equal in all their parts.
6th. If two triangles have two sides of the one equal to two sides of the other, each to each, and the included angles are equal, the third side will be greater in the triangle, having the greater included angle.
7th. If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles will be equal in all their parts.
8th. In an isosceles triangle the angles opposite the equal sides are equal.
9th. If two angles of a triangle are equal, the sides opposite them are also equal, and the triangle is isosceles.
10th. In any triangle the greater side is opposite the greater angle, and conversely, the greater angle is opposite the greater side.
11th. In every triangle the sum of the three angles is equal to two right angles.

2. *Of Quadrilaterals.*

1st. In any parallelogram the opposite sides and angles are equal, each to each.
2d. If the opposite sides of a quadrilateral are equal, each to each, the equal sides are parallel, and the figure is a parallelogram.
3d. If two sides of a quadrilateral are equal and parallel, the figure is a parallelogram.
4th. The diagonals of parallelograms bisect each other, and the sum of their squares is equivalent to the sum of the squares of the four sides of the parallelogram.

3. *Of Polygons.*

1st. Similar polygons may be divided into the same number of trian-

gles; and to each triangle in one of the polygons there will be a corresponding triangle in the other polygon. These triangles are similar and similarly situated.

2*d*. The perimeter of similar polygons are to one another as their homologous sides; and their areas to one another as the squares of their homologous sides.

3*d*. If the sides of a convex polygon be produced so as to form one exterior angle at each vertex, the sum of the exterior angles will be equal to four right angles.

4. *Of Proportion.*

1*st*. If four quantities are in proportion, they will be in proportion by alteration.

2*d*. If four quantities be in proportion, the product of the means will equal the product of the extremes.

3*d*. Magnitudes which are proportional to the same proportionals, are proportional to each other.

4*th*. If the product of two magnitudes equals the product of two other magnitudes, two of them may be made the means, and two the extremes of a proportion.

5*th*. If four quantities are proportional, the sum of the first and second is to their difference as the sum of the third and fourth is to their difference.

6*th*. The product of the corresponding terms of two proportions are proportional.

7*th*. If four quantities are proportional, we can multiply the antecedents or consequents, or divide them by the same quantity, and the results will be proportional.

8*th*. If three quantities are in proportion, the first is to the third as the square of the first is to the square of the second.

5. *Squares on Lines.*

1*st*. The square described on the sum of any two lines, is equal to the sum of the squares described on the lines, plus twice the rectangle of the lines.

2*d*. The square described on the difference of two lines, is equal to the sum of the squares described on the two lines, diminished by twice the rectangle contained by the lines.

3*d*. The difference of the squares described on any two lines, is equal to the rectangle contained by the sum and difference of the lines.

4*th*. The square described on the hypotenuse of any right-angled triangle, is equal to the sum of the squares described on the other two sides.

5*th*. In any obtuse-angled triangle, the square of the side opposite the obtuse angle is equivalent to the sum of the squares of the other two sides, plus twice the product of the base into the distance from the vertex of the obtuse angle to the foot of the perpendicular drawn from the vertex of the opposite angle to the base produced.

6*th*. In any triangle, the squares on a side opposite an acute angle is less than the sum of the squares on the other two sides, by twice the

rectangle contained by either of these sides, and the distance from the vertex of the acute angle to the foot of the perpendicular let fall on this side, or side produced, from the vertex of the opposite angle.

6. *Of Similar Triangles.*

1*st*. Triangles which have their corresponding sides proportional are similar.
2*d*. If any triangle have its sides respectively proportional to the like sides of any other triangle, each to each, then the two triangles will be equiangular and similar.
3*d*. Two triangles having an angle in one equal to an angle in the other, and the sides about these equal angles proportional, are equiangular and similar.
4*th*. Triangles which have their sides parallel, each to each, or perpendicular, each to each, are similar.

7. *Of the Circle.*

1*st*. Equal angles at the centre of a circle are subtended by equal chords.
2*d*. Any radius which is perpendicular to a chord bisects the chord, and also the arc subtended by the chord.
3*d*. A circumference may be made to pass through three points which are not in the same line.
4*th*. In equal circles, equal chords are equally distant from the centre.
5*th*. Parallel lines intercept equal arcs on the same circumference.
6*th*. If two circles touch each other, either internally or externally, the two centres and the point of contact will be on the same line.

8. *Of Measurement of Angles.*

1*st*. An angle having its vertex at the centre of a circle, is measured by the arc included between its sides.
2*d*. An angle formed by a secant and a tangent, is measured by one-half of the difference of the intercepted arcs.
3*d*. An angle formed by two chords which intersect, is measured by half the sum of the included arcs.
4*th*. When two chords intersect each other in a circle, the rectangle contained by the segments of the one, will be equal to the rectangle contained by the segments of the other.
5*th*. If two secants intersect each other at right angles, the sum of their squares, increased by the sum of the squares of the two segments without the circle, will be equal to the square of the diameter of the circle.
6*th*. The sums of the opposite sides of a quadrilateral circumscribing a circle are equal.

9. *Of the Circumference and Area of Circles.*

1*st*. The circumference of circles are as their radii, and their areas as the squares of the radii.

2*d*. The area of any circle is equal to the product of its radius by one-half of its circumference.
3*d*. The areas of any two circles are to each other as the squares of their diameters.
4*th*. When the radius of a circle is unity, its area and circumference are numerically equal.

10. *Of Planes and their Angles.*

1*st*. If two Planes meet each other, their common points will be found in, and form one straight line.
2*d*. If a straight line is perpendicular to two straight lines of a plane at the point of their intersection, it is perpendicular to the plane of those lines.
3*d*. If two straight lines are perpendicular to the same plane, they will be perpendicular to each other.
4*th*. The line which joins any point of a perpendicular to a plane, with a point in which a line in the plane is intersected, at right angles, by a line through the foot of the perpendicular, will be at right angles to the line in the plane.
5*th*. If a plane meet two parallel planes, the lines of intersection are parallel.
6*th*. If two straight lines be drawn in any direction through parallel planes, the planes will cut the lines proportionately.
7*th*. Either of the three plane angles which form a triedral angle, is less than the sum of the other two.
8*th*. The sum of the plane angles forming any polyedral angle, is less than four right angles.
9*th*. If two solid angles are formed by three plane angles respectively equal to each other, the planes which contain the equal angles will be equally inclined to each other.

11. *Of Solids.*

1*st*. The convex surface of a right prism is equal to the perimeter of the base multiplied by the altitude.
2*d*. If three plane faces bounding a solid angle of one prism, be equal to the three plane faces bounding a solid angle of another, each to each, and similarly disposed, the prisms will be equal.
3*d*. The opposite faces of a parallelopipedon are equal and parallel.
4*th*. Two parallelopipedons having equal bases and equal altitudes are equal.
5*th*. The volume of any parallelopipedon, and in general any prism, is measured by the product of its base and altitude, or the product of its three dimensions.
6*th*. Similar triangular prisms are to each other as the cubes of their like dimensions.
7*th*. The two triangular prisms into which any parallelopipedon is divided, by a plane passing through its opposite diagonal edges, are equal.
8*th*. The volume of any prism is measured by the product of the area of its base and altitude.

12. *Of the Pyramid, Cylinder, Cone, etc.*

1*st*. The convex surface of a right pyramid is equal to the perimeter of the base multiplied by one-half the slant height.
2*d*. If two triangular pyramids have equivalent bases, and equal altitudes, they are equal in volume.
3*d*. The volume of any pyramid is measured by one-third of the product of its base and altitude.
4*th*. The volume of a frustrum of a triangular pyramid is equal to the sum of the volumes of three pyramids, whose common altitude is the altitude of the frustrum, and whose bases are the lower base of the frustrum, the upper base of the frustrum, and a mean proportional between two bases.
5*th*. The volume of a cylinder is equal to the area of its base multiplied by its altitude.
6*th*. The convex surface of a cylinder is equal to the circumference of its base multiplied by its altitude.
7*th*. The volume of a cone is measured by the area of its base multiplied by one-third of its altitude.
8*th*. The convex surface of a frustrum of a cone is equal to one-half of the sum of the circumferences of the upper and lower bases, multiplied by the slant height.
9*th*. The volume of the frustrum of a cone is equivalent to the sum of the volumes of three cones, having for their common altitude the altitude of the frustrum, and for their several bases the bases of the frustrum and a mean proportional between them.
10*th*. The surface of a sphere is measured by the circumference of one of its great circles multiplied by its diameter.
11*th*. If a regular semi-polygon be revolved about its axis, the surface generated by the semi-perimeter, will be equal to the circumference of the inscribed circle multiplied by the axis.
12*th*. The volume of a sphere is to the volume of the circumscribed cylinder, as the surface of the sphere is to the surface of the cylinder.
13*th*. The volume of a sphere is equal to its surface multiplied by one-third of its radius.

13. *Of Spherical Geometry.*

1*st*. Any side of a spherical triangle is less than the sum of the other two.
2*d*. Any side of a spherical polygon is less than the sum of the other two.
3*d*. The sum of the sides of a spherical polygon is less than the circumference of a great circle.
4*th*. If from the vertices of the angles of a spherical triangle, as poles, arcs be described forming a spherical triangle, the vertices of the angle of the second triangle will be respectively poles of the sides of the first.
5*th*. The sum of the angles of a spherical triangle is less than six right angles and greater than two.
6*th*. If two triangles on the same, or on equal spheres, are mutually equiangular, they are also equilateral.
7*th*. If two circumferences of great circles intersect on the surface of a hemisphere, the sum of either two of the opposite triangles thus

formed is equal to a line whose angle is equal to that formed by the circles.

8*th*. The area of a spherical polygon is equal to its spherical excess multiplied by the tri-rectangular triangle.

14. *Mensuration.*

I. TRIANGLE.
1. The area of a triangle equals the base multiplied by one-half the altitude; or,
2. The square root extracted from the continued product of the differences between each side, and the one-half of the sum of the sides, multiplied by the half sum of the sides.

II. PARALLELOGRAM. The area of a parallelogram is equal to the product of the base by the altitude.

III. TRAPEZOID. The area of a trapezoid is equal to the product of the altitude by one-half the sum of the parallel sides.

IV. TRAPEZIUM. The area of a trapezium is equal to the sum of the areas of the two triangles into which it may be divided.

V. POLYGONS.
1. The area of regular polygons is equal to the product of one-half the perimeter multiplied by the perpendicular let fall from the centre on one of the sides.
2. The area of irregular polygons is equal to the sum of the areas of the triangles into which the polygon may be divided.

VI. CIRCLE.
1. The area of a circle equals the diameter multiplied by 3.1416.
2. The length of an arc equals the number of degrees multiplied by the radius, and this product by .01745.
3. The area of a circle is equal to the circumference multiplied by one-fourth of the diameter, or the square of the diameter multiplied by .7854.
4. The area of a sector is equal to the arc multiplied by one-half the radius.
5. The area of a circular ring is equal to difference of the squares of the radii multiplied by 3.1416.
6. The side of an inscribed square is equal to the diameter multiplied by .7071, or, the circumference multiplied by 2251.

VII. ELLIPSE. The area of an ellipse is equal to the product of half of the two axes, multiplied by 3.1416.

VIII. PRISM.
1. The convex surface of a right prism is equal to the product of the perimeter of the base by the altitude.
2. The entire surface equals the convex surface plus the bases.
3. The contents of a prism equals the area of the base multiplied by the altitude.

IX. PYRAMID.
1. The convex surface of a right pyramid is equal to the perimeter of the base multiplied by one-half the slant height.
2. The contents of a pyramid equals the base multiplied by one-third the altitude.

X. CYLINDER.
1. The convex surface of a cylinder equals the circumference of the base multiplied by the altitude.
2. The contents of a cylinder equals the area of the base multiplied by the altitude.

XI. CONE.
1. The surface of a cone equals the circumference of the base into one-half of the slant height.
2. The contents of a cone equals the area of the base into one-third of the altitude.

XII. THE FRUSTRUM.
1. The surface of the frustrum of a pyramid or cone equals the sum of the circumferences of the two bases, multiplied by one-half the slant height.
2. The contents of the frustrum of a pyramid or cone, equals the square root of the product of the two bases, plus the sum of the two bases, and this multiplied by one-third of the altitude of the frustrum.

XIII. SPHERE.
1. The surface of a sphere equals the circumference multiplied by the diameter, or,
2. The square of the radius multiplied by 4 and 3.1416.
3. The surface of a zone equals the height of the zone multiplied by the circumference of a great circle of the sphere.
4. The contents of a sphere equals the surface multiplied by one-third of the radius, or.
5. The cube of the diameter multiplied by $\frac{1}{6}$ of 3.1416.

XIV. CYLINDRICAL RINGS.
The surface of a cylindrical ring equals the thickness of the ring plus the inner diameter, multiplied by the thickness of the ring, and this multiplied by 9.8696.

SECTION XXI.

TRIGONOMETRY.

I. TERMS.

1. Plane Trigonometry.
2. Solution.
3. Quadrant.
4. Complement.
5. Supplement.
6. Sine.
7. Cosine.
8. Tangent.
9. Cotangent.
10. Secant.
11. Cosecant.

II. PRINCIPLES.

1. The sine of an arc equals the sine of its supplement, and also the cosine of an arc equals the cosine of its supplement.
2. The tangent and cotangent of an arc are respectively equal to the tangent and cotangent of the supplement of the arc.
3. The secant and cosecant of an arc are respectively equal to the secant and cosecant of the supplement of the arc.

III. THEOREMS.

1. The sum of the sines of any two arcs is to the difference of the same sines, as the tangent of one-half the sum of the same arcs is to the tangent of one-half of their difference.
2. In any plane triangle, the sides are proportional to the sines of the opposite angles.
3. In any plane triangle, if a line is drawn from the vertical angle perpendicular to the base, then the whole base will be to the sum of the other two sides as the difference of those sides is to the difference of the segments of the base.
4. The hypotenuse is to either side, as the radius is to the sine of the angle opposite to that side.
5. One side of a right-angle triangle is to the other side, as the radius is to the tangent of the angle adjacent to the first side.
6. One side of a right-angle triangle is to the hypotenuse, as the radius is to the secant of the angle adjacent to that side.

IV. SPHERICAL TRIGONOMETRY.

1. Any two sides of a spherical triangle are together greater than the third side.

IV. SPHERICAL TRIGONOMETRY.

2. The sum of the three sides of any spherical triangle, is less than the circumference of a great circle.
3. In any right-angled spherical triangle, the sine of one side is to the tangent of the other side, as the radius is to the tangent of the angle adjacent to the first mentioned side.
4. In any right-angled spherical triangle, the sine of the right angle is to the sine of the hypotenuse, as the sine of either of the other angles is to the sine of side opposite to that angle.

V. OBLIQUE-ANGLED.

1. In all spherical triangles, the sines of the sides are to each other as the sines of the angles opposite to them.
2. If from any angle of a spherical triangle, a perpendicular be let fall on the base, or on the base produced, the tangents of the segments of the base will be reciprocally proportional to the cotangents of the segments of the angle.
3. The same construction remaining, the sines of the segments of the base are to each other as the cotangents of the adjacent angles.
4. The cosine of any of the angles of a spherical triangle, is equal to the product of the sines of the other two angles multiplied by the cosine of the included side, minus the product of the cosines of these other two angles.

VI. PRACTICAL PRINCIPLES.

1. The sine of the sides of spherical triangles are proportional to the sines of their opposite angles.
2. The sines of the segments of the base, made by a perpendicular from the opposite angle, are proportional to the cotangents of their adjacent angles.
3. The cosines of the angles at the base are proportional to the sines of the corresponding segments of the vertical angle.
4. The cosines of the segments of the vertical angle are proportional to the cotangents of the adjoining sides of the triangle.

SECTION XXII.

ASTRONOMY.

CHAPTER I.—DEFINITIONS, ETC.

- I. TERMS.
  - 1. *Extension.*
  - 2. *Line.*
    - 1. Straight.
    - 2. Curved.
  - 3. *Point.*
  - 4. *Surface.*
  - 5. *Circle.*
    - 1. Diameter.
    - 2. Circumference.
    - 3. Radius.
    - 4. Arc.
  - 6. *Plane.*
  - 7. *Tangent.*
  - 8. *Semicircle.*
  - 9. *Angle.*
    - 1. Angle of vision.
    - 2. Right Angle.
    - 3. Acute Angle.
    - 4. Obtuse Angle.
    - 5. Triangle.
  - 10. *Parallels.*
  - 11. *Ellipse.*
  - 12. *Axis.*
  - 13. *Eccentricity.*
  - 14. *Sphere.*
    - 1. Diameter.
    - 2. Hemisphere.
    - 3. Radius.
      - 1. Great.
      - 2. Small.
    - 4. Circle.
      - 3. Poles.
  - 15. *Spheroid.*
    - 1. Oblate.
    - 2. Prolate.
- II. THE HEAVENLY BODIES.
  - 1. Apparent motions.
  - 2. Primary Planets.
  - 3. Secondary Planets.
  - 4. Stars.
  - 5. Comets.
  - 6. Luminous.
  - 7. Opaque.
- III. THE SUN.
- IV. THE PLANETS.
  - 1. *Primary.*
    - 1. Mercury.
    - 2. Venus.
    - 3. Earth.
    - 4. Mars.
    - 5. Jupiter.
    - 6. Saturn.
    - 7. Uranus.
    - 8. Neptune.
  - 2. *Minor Planets.*
    - 1. Asteroids.
    - 2. Planetoids.
  - 3. *Satellites.*
  - 4. *Revolution.*
    - 1. Centrifugal.
    - 2. Centripetal.
  - 5. *Perihelion.*
  - 6. *Aphelion.*
  - 7. *Ascending nodes.*
  - 8. *Descending nodes.*

IV. THE PLANETS.
- 9. *Distance from sun.*
- 10. *Time to make revolution.*
- 11. *Velocity.*
- 12. *Axis.*
- 13. *Aspect.*
  - 1. Conjunction. { 1. Inferior. 2. Superior.
  - 2. Quadrature.
  - 3. Opposition.
  - 4. Elongation.

CHAPTER II.—PLANETS IN THEIR ORDER.

I. THE EARTH.
- 1. *Poles.* { 1. North. 2. South.
- 2. *Latitude.*—Parallels.
- 3. *Longitude.*—Meridians.
- 4. *Horizon.*
  - 1. Sensible.
  - 2. The Dip.
  - 3. Rational.
  - 4. Poles. { 1. Zenith. 2. Nadir.
- 5. *Circles of motion.* { 1. Diurnal. 2. Nocturnal.
- 6. *Circles of perpetual apparition.*
- 7. *Circles of perpetual occultation.*
- 8. *Parallax.*
- 9. *Refraction.*
- 10. *Apparent motions of the Sun and Stars from earth.*
  - 1. Ecliptic or Equinoctial.
  - 2. Obliquity of Ecliptic.
  - 3. Vernal Equinox.
  - 4. Autumnal.
  - 5. Right ascension.
  - 6. Signs of Ecliptic.
  - 7. Zodiac.
- 11. *Day and night.*
  - 1. Tropics. { 1. Of Cancer. 2. Of Capricorn.
  - 2. Polar circles. { 1. Arctic. 2. Antarctic.
  - 3. Twilight.
  - 4. Dawn.
- 12. *Seasons.* { 1. Cause. 2. Names.
  - 1. Spring.
  - 2. Summer.
  - 3. Autumn.
  - 4. Winter.
- 13. *Zones.*
  - 1. Frigid.
  - 2. Temperate.
  - 3. Torrid.
- 14. *Shape and size.*
- 15. *Time.*
  - 1. Solar day.
  - 2. Mean solar day.
  - 3. Equation of time.
  - 4. Sidereal year.
  - 5. Tropical year.

II. THE SUN.
- 1. Distance from earth (95,000,000 miles).
- 2. Apparent diameter (852,900 miles).
- 3. Figure (sphere).

II. THE SUN.
- 4. The spots.
  - 1. Appearance.
  - 2. Variability.
- 5. Rotation (25⅓ days).
- 6. Revolution.
- 7. Zodiacal light.

III. THE MOON.
- 1. *Perigee.*
- 2. *Apogee.*
- 3. *Diameter* (2162 *miles*).
- 4. *Phases.*
- 5. *Synodical period* (29½ *days*).
- 6. *Harvest moon.*
- 7. *The Polar regions.*
- 8. *Moonlight in winter.*
- 9. *Rotation* (27⅓ *days*).
- 10. *Lunar orbit.*
- 11. *Librations of moon.*
- 12. *Position of Lunar axis.*
- 13. *Lunar mountains.*
  - 1. Copernicus.
  - 2. Height of mountains.
- 14. *Irregular motion.*
- 15. *Eclipses.*
  - 1. Solar.
  - 2. Lunar.
- 16. *Shadow.*
  - 1. Length (228,000 miles).
  - 2. Breadth (128 miles).
- 17. *Tides.*
  - 1. Flood.
  - 2. Ebb.

IV. MERCURY.
- 1. *Diameter* (3000 *miles*).
- 2. *Rotation* (24 *hours*).
- 3. *Revolution.*
  - 1. Sidereal (88 days).
  - 2. Synodic (116 days).
- 4. *Elongation* (28¼°).
- 5. *Light and heat.*
- 6. *Seasons.*
- 7. *Transits.*
  - 1. Limits.
  - 2. Time of occurrence.

V. VENUS.
- 1. *Phases.*
- 2. *Diameter* (7510).
- 3. *Mountains.*
- 4. *Rotation* (23 *hours*).
- 5. *Revolution.*
  - 1. Sidereal (224⅔ days).
  - 2. Synodic (584½ days).
- 6. *Seasons.*
- 7. *Transits.*
- 8. *Apparent motion.*

VI. MARS.
- 1. *Phases.*
- 2. *Apparent motions.*
- 3. *Inclination.*
- 4. *Diameter* (4300 *miles*).
- 5. *Rotation* (24½ *hours*).
- 6. *Revolution.*
  - 1. Sidereal (687 days).
  - 2. Synodic (780 days).
- 7. *Satellites.*

VII. JUPITER.
- 1. *Diameter* (85,000).
- 2. *Rotation* (10 *hours nearly*).
- 3. *Revolution.*
  - 1. Sidereal (4332 days).
  - 2. Synodic (399 days).

VII. JUPITER.
4. *Oblateness* (5000).
5. *Velocity* (5000 *miles in minute*).
6. *Belts.*
7. *Satellites.*
   1. Their Number.
   2. Their Diameters.
      1. 2300 miles.
      2. 2070 miles.
      3. 3400 miles.
      4. 2900 miles.

VIII. SATURN.
1. *Inclination.*
2. *Rotation* (10½ *hours*).
3. *Revolution.*
   1. Sidereal (10,759 days, or, 29½ years).
   2. Synodical (378 days).
4. *Diameter* (74,000).
5. *Oblateness* (7800).
6. *Belts.*
7. *Rings.*
   1. Interior.
   2. Anterior.
   3. Rotation.
   4. Stability.
   5. Appearance.
8. *Satellites.*
   1. Mimas.
   2. Enceladus.
   3. Tethys.
   4. Dione.
   5. Rhea.
   6. Titan.
   7. Hyperion.
   8. Japetus.

IX. URANUS.
1. *Eccentricity* (82,000,000 *miles*).
2. *Inclination* (46½′).
3. *Diameter* (33,247).
4. *Rotation* (*unknown*).
5. *Revolution.*
   1. Sidereal (30,687 days).
   2. Synodic (369.65 days).
6. *Satellites.*
   1. Ariel.
   2. Umbriel.
   3. Titania.
   4. Oberon.

X. NEPTUNE.
1. *Eccentricity* (24,000,000 *miles*).
2. *Inclination* (1⅜°).
3. *Diameter* (37,000).
4. *Revolution.*
   1. Sidereal (60,127 days).
   2. Synodic (367¾ days).
5. *Satellites.*

CHAPTER III.—MINOR PLANETS, COMETS, ETC.

I. MINOR PLANETS.
1. Average distance from sun (260,000,000).
2. Inclination of their orbits.
3. Eccentricity.
4. Largest (Pallas).
5. Brightest (Vestor).
6. Faintest (Atalanta).
7. Their natural attraction.
8. Affected motions.
9. Their masses.

II. COMETS.
- 1. *Parabolas.*
- 2. *Hyperbolas.*
- 3. *Elements.*
- 4. *Elliptic comets.*
- 5. *The number* (*From* 4000 *to* 5000).
- 6. *Their size.*
- 7. *Masses and densities.*
- 8. *Tails.*
- 9. *Remarkable Comets.*
  - 1. Of 1680 (Tail 120,000,000 miles).
  - 2. Halley's Comet.
  - 3. Lexell's Comet.
  - 4. Comet of 1774 (six tails).
  - 5. Biela's Comet.
  - 6. Comet of 1811 (Tail 25° long and 0° wide).
  - 7. Donati's Comet.
  - 8. Comet of 1861 (Tail 100° long).

III. METEORS AND STARS.
- 1. *Meteors.*
  - 1. Meteoric epochs.
  - 2. Fire Balls.
- 2. *Stars.*
  - 1. Annual Parallax.
  - 2. Magnitudes.
  - 3. Constellations.
    - 1. Sirius.
    - 2. Regulus.
    - 3. Arcturus.
    - 4. Whole number (109).
    - 5. Northern Constellation.
    - 6. Zodiacal Constellation.
    - 7. Southern Constellation.
  - 4. Star names.
  - 5. Star figures.
  - 6. Apparent places.
  - 7. Solar Nutation.
  - 8. Aberration.
  - 9. Galaxy.
  - 10. Proper motion of stars.
  - 11. Multiple stars.
  - 12. Binary.
    - 1. Orbits.
    - 2. Periods.
  - 13. Constitution of stars.
  - 14. Variable stars.
  - 15. Clusters.

IV. NEBULÆ.
- 1. Distance.
- 2. Elliptic.
- 3. Annular.
- 4. Spiral.
- 5. Planetary.
- 6. Stellar.
- 7. Nebulous.
- 8. Irregular Nebula.
- 9. Double Nebula.
- 10. Variable Nebula.

SECTION XXIII.

METHODS OF INSTRUCTION, OR THE ART OF TEACHING.

CHAPTER I.—LANGUAGE AND PHYSICAL SCIENCE.

- I. The elements of knowledge.
  - 1. *Should teach to exercise the senses.*
  - 2. *Should teach to speak correctly.*
  - 3. *Pupils should be inspired to seek for knowledge.*
  - 4. *The teaching should be such as would inspire a love for the good and the true.*
  - 5. *The elements of the Arts should be taught.*
  - 6. *Should teach by Object lessons.*
    - 1. Their design.
    - 2. The matter for lesson.
    - 3. Preparation for lesson.
    - 4. Manner of conducting lesson.
- II. Instructions in language.
  - 1. *Primary Reading.*
    - 1. The A, B, C, Method.
      - 1. Taught from books.
      - 2. Taught from cards.
      - 3. Taught from blackboard.
      - 4. Taught from blocks.
    - 2. The Word Method.
      - 1. Names of pictures.
      - 2. Names of words.
      - 3. Names of letters.
  - 2. *Pronunciation.*
    - 1. The alphabetic method.
    - 2. Phonic alphabetic method.
    - 3. Phonetic alphabetic method.
    - 4. By Association.
    - 5. Eclective method.
  - 3. *Orthography.*
    - 1. Oral spelling.
    - 2. Writing on slates.
    - 3. Writing on blackboards.
    - 4. Poor spelling.
    - 5. Dictation exercises.
  - 4. *Reading as an Art.*
    - 1. Pronunciation.
      - 1. Articulation.
      - 2. Accent.
    - 2. Modulation.
      - 1. Pitch.
        - 1. Low.
        - 2. Medium.
        - 3. High.
      - 2. Force.
        - 1. Loud.
        - 2. Moderate.
        - 3. Gentle.

- II. Instructions in Language.
  - 4. *Reading as an Art.*
    - 2. Modulation.
      - 3. Quality.
        1. Pure.
        2. Orotund.
        3. Guttural.
        4. Aspirated.
        5. Pectoral.
        6. Tremulous.
    - 3. Expression.
    - 4. Posture.
    - 5. Gesture.
      1. Prominent words.
      2. Define words.
      3. Define sentences.
      4. Explain language.
      5. Explain marks.
      6. Bring out sentiment.
      7. Give manner of delivery.
      8. Tell why.
    - 6. Analyze Subject.
  - 5. *Grammar.*
    - 1. Parts of speech.
      1. Begin at verbs.
      2. Nouns.
      3. Adjectives.
      4. Adverbs.
      5. Pronouns.
      6. Preposition.
      7. Conjunction.
      8. Interjection.
    - 2. Build sentences.
      1. Use words.
      2. Phrases.
      3. Clauses.
      4. Give subject.
      5. Give predicate.
      6. Elements.
        1. Adjective.
        2. Adverbial.
        3. Independent.
        4. Connectives.
  - 6. *Rhetoric.*
    - 1. Discourse.
      - 1. Prose.
        1. Orations.
        2. Lectures.
        3. Essays.
        4. Fictions.
        5. Narratives.
        6. Letters.
      - 2. Poetry.
        1. Epic.
        2. Lyric.
        3. Pastoral.
        4. Didactic.
        5. Dramatic.
        6. Satires.
      - 3. Qualities of Discourse.
        1. Purity.
        2. Propriety.
        3. Precision.
        4. Perspicuity.
        5. Strength.
        6. Euphony.
        7. Harmony.
        8. Unity.

II. INSTRUCTIONS IN LANGUAGE.

6. *Rhetoric.*

1. Discourse.
   4. Style of Discourse.
      1. Dry.
      2. Plain.
      3. Neat.
      4. Elegant.
      5. Florid.
      6. Simple.
      7. Labored.
      8. Concise.
      9. Nervous.

2. Composition.
   1. Teach conversation upon familiar subjects.
   2. Reproduce reading lessons.
   3. Write about familiar subjects.
   4. Write from dictation exercises.
   5. Correct faulty sentences.
   6. Reproduce narratives read by teacher.
   7. Assign simple subjects.
   8. Teach higher composition.

7. *Logic.*
   1. Teach its definitions and use.
   2. Teach its inductions.
   3. Teach its demonstrations.
   4. Teach its applications.

III. GEOGRAPHY.

1. Teach familiar objects in school-room.
2. Teach similar objects around school premises.
3. Teach similar objects at a distance.
4. Teach the measure of distance by objects at different points in the room.
5. Enlarge upon distance from school-room to places in the neighborhood.
6. Expand to different places in the District.
7. Go from one inch, to one foot, then the number of feet in a mile, and to the whole distance from place to place.
8. Teach direction, first in the room, after, as distance.
9. Teach from maps and globes.
10. Teach geographical terms.
11. Teach township geography.
12. Teach map drawing.
13. Teach particular geography.
14. Teach the earth as a whole.
15. Teach the form and size of the earth.
16. Teach the motions of the earth.
17. Physical construction of the earth.
18. Plants, animals, and minerals.
19. Political geography.
20. The Earth as a planet.
21. Its relation to the other heavenly bodies.

IV. HISTORY.

1. Teach familiar facts.
2. Teach that any fact is history.

IV. HISTORY.
3. Teach that facts compiled make history.
4. Have pupils repeat facts.
5. Teach strong facts.
6. Teach interesting facts.
7. Inspire a love for history.
8. Then show how facts connected make up the continuous history of the country.
9. Don't dwell upon dates, except the very important.
10. Teach the relation existing between facts.
11. Teach contemporaneous history.
12. Teach the philosophy of history.

CHAPTER II.—MATHEMATICS AND ART.

I. ARITHMETIC.

1. *Elementary.*
1. Teach to count; Blackboard exercises in counting marks, etc.
2. Teach to make figures.
3. Teach to write numbers by figures.
4. Teach to read numbers.
5. Teach to add numbers.
6. Teach to subtract numbers.
7. Teach to multiply numbers.
8. Teach to divide numbers.
9. Teach principles of Addition, Subtraction, etc.
10. Be thorough in teaching principles.
11. Teach the combination of numbers.
12. Teach practical problems in the four rules.
13. Apply their knowledge to everyday business.

2. *Relation of numbers.*
1. Teach the relation of numbers to numbers.
2. Teach the relation of numbers to fractions.
3. Teach the relation of fractions to numbers.
4. Teach the relation of fractions to fractions.
5. Teach factoring.
6. Teach Common Divisor.
7. Teach Common Multiple.
8. Drill thorough on these principles.

3. *Fractions.*
1. Teach them orally.
2. They are only concrete numbers, the denominator naming the object.

I. ARITHMETIC.

3. *Fractions.*
   3. The different kinds.
   4. The methods of operation.
   5. Teach the principles.
   6. Teach them practically, or written.
   7. Teach pupils to form problems embracing simple fractions.
   8. Give plenty of practical problems outside of the book.
   9. Teach application of rules as derived from solutions.

4. *Decimals.*
   1. Teach to write decimals.
   2. Be thorough on the place of point.
   3. Teach to read decimals.
   4. Teach to add decimals.
   5. Teach to subtract decimals.
   6. Teach to multiply decimals.
   7. Teach to divide decimals.
   8. The principles.
   9. The application of decimals to United States money.
   10. Their application to per cent., etc.
   11. Teach reduction to common fractions, and vice versa.
   12. Practical problems.

5. *Denominate Numbers.*
   1. Reduction. (1. Up. 2. Down.)
   2. Addition.
   3. Subtraction.
   4. Multiplication.
   5. Division.
   6. Applications to every-day business.
   7. Principles of relation between different tables.

6. *Ratio and Proportion.*
   1. Teach the relation between this, and Multiplication and Division.
   2. Apply relation of numbers.
   3. Teach principles.
   4. Make practical problems.
   5. Apply principles as proof of correctness.
   6. Apply rules to solutions.

7. *Percentage, Interest, etc.*
   1. Teach the terms used.
   2. Teach the principles.
   3. Teach the formulas.
   4. Teach the applications.
   5. Teach the solution of problems.
   6. Teach the application of rules.

8. *Alligation.*—The same as proportion.

9. *Progression.*
   1. Teach quantities. (1. First. 2. Second. 3. Number of terms. 4. Last term. 5. Common difference.)
   2. Principles.
   3. Explain the terms.
   4. Application to practical problems.

- I. Arithmetic.
  - 10. *Involution.*
    - 1. The principles.
    - 2. Demonstrations.
  - 11. *Evolution.*
    - 1. Principles.
    - 2. Demonstrations.
      - 1. Square Root.
      - 2. Cube Root.
  - 12. *Mensuration.*
    - 1. Principles.
    - 2. Terms.
    - 3. Figures.
    - 4. Applications.
- II. Algebra.
  1. Teach symbols.
  2. Teach the idea.
  3. Teach the solution of problems.
  4. Teach equations.
  5. Teach the principles.
  6. Teach general applications.
- III. Geometry.
  1. Teach the forms of figures.
  2. Theorems.
  3. Practical applications.
  4. Demonstrations of problems.
- IV. Art, penmanship.
  1. Teach conception of letters.
  2. Teach parts of letters.
  3. Teach formation of letters.
  4. Teach words.
  5. Teach sentences.
- V. Drawing.
  1. Form straight lines.
  2. Form curved lines.
  3. Make forms from straight lines.
  4. Make forms from curved lines.
  5. Imitation of objects.
  6. Invent forms.
  7. Copy pictures of objects.
  8. Draw pictures from memory.
  9. Draw real objects from memory.

SECTION XXIV.

SCIENCE OF TEACHING, OR SCHOOL MANAGEMENT.

CHAPTER I.—SCHOOL GRADES, STUDIES, FURNITURE AND APPARATUS.

- I. School grades.
  - 1. *Reasons for grading.*
    1. To concentrate teaching force.
    2. To lessen the expense of teaching.
    3. To secure the greatest good.
    4. To facilitate labor.
    5. To promote good order.
    6. To stimulate pupils to excel.
    7. To provide higher instruction.
    8. To provide schools to educate children at home.
  - 2. *Manner of grading.*
    1. Union grade.
    2. Separate grades.
    3. By central, high-school, and township primaries.
  - 3. *Number of grades.*
    1. Primary.
    2. Intermediate.
    3. Grammar.
    4. High school.
- II. School studies.
  - 1. *High Schools.*
    1. Language.
       1. Grammar.
       2. Rhetoric.
       3. Logic.
    2. Physical Science.
    3. Mathematical Science.
       1. Higher Arithmetic.
       2. Algebra.
       3. Geometry.
       4. Trigonometry, etc.
    4. Mental Science.
    5. Moral Science.
    6. Vocal Music.
  - 2. *Grammar Schools.*
    1. Language.
       1. Grammar.
       2. Elements of Rhetoric.
       3. Literature.
    2. Reading.
    3. Elements of the Sciences.
    4. Mathematics.
       1. Arithmetic.
       2. Elements of Higher Arithmetic.
    5. Penmanship.
    6. Drawing.
  - 3. *Intermediate.*
    1. Elements of Geography.
    2. Language.
    3. Elements of Arithmetic.
    4. Penmanship.

II. SCHOOL STUDIES.
- 3. *Intermediate.*
  - 5. Drawing.
  - 6. Reading.
  - 7. Spelling.
- 4. *Primary.*
  - 1. Object teaching.
  - 2. Oral teaching.
  - 3. Reading.
  - 4. Spelling.

1. Geography.
2. Language.
3. Composition.
4. Arithmetic.

III. FURNITURE.
- 1. *Desks.*
  1. Number of desks.
  2. Size of desks.
  3. Arrangement of desks.
  4. Teacher's desk.
  5. Ink table or desk.
  6. Kind of desks.
- 2. *Platform.*
  1. Position.
  2. Size.
  3. Height.
- 3. *Blackboard.*
  1. Size.
  2. Position.
- 4. *Clock.*
  3. Use.
- 5. *Call bell.*
- 6. *Umbrella-stand.*
- 7. *Hat-rack.*
- 8. *Settees for visitors.*
- 9. *Chairs.*
- 10. *Brooms and Brushes.*

IV. APPARATUS.
1. Elementary chart.
2. Writing and drawing charts.
3. Numerical frames.
4. Square and Cubical blocks.
5. Globes.
6. Outline maps and charts.
7. Philosophical apparatus.
8. Cabinets.
9. Libraries.
10. Dictionary.
11. Bible.
12. Receptacle for these things.

CHAPTER II.—ORGANIZATION OF SCHOOL.

I. TEMPORARY.
1. See the citizens with respect to school.
2. See your predecessor.
3. Have a first day's programme.
4. Temporary seating.
5. Fix opening and closing time.
6. Fix recess hours.
7. Fix arrangement for privileges.
8. Regulate whispering.
9. Make regulations for exercise.

II. PERMANENT.
1. Fix the branches to be taught.
2. Fix the branches to be studied by individuals.
3. Arrange for the use of text books.
4. Arrange for oral teaching.
5. Arrange for classification.
6. Arrange a time for study.
7. Arrange a time for recitation.
8. Arrange a good programme.
9. See what pupils to be admitted.
10. Fix the limits of the school.
11. Fix the length of the day.
12. Fix the length of the recess.
13. Fix the time for closing.
14. Arrange for calling and dismissing classes.
15. Arrange for granting special privileges.
16. Arrange for giving special aid to pupils.
17. Arrange for general business.
18. Arrange for exercise of discipline.

CHAPTER III.—EMPLOYMENT OF SCHOOL.

I. STUDY.

1. *Object of study.*
1. To gain knowledge.
2. For mental discipline.
3. To stimulate pupils to aspirations for the true and noble.
4. To create efficiency in pupils.

2. *Incentives to study.*
1. Prizes.
2. Merit marks.
3. Emulation.
4. Fear of punishment.
5. Shame.
6. Ridicule.
7. Approval of teacher.
8. Approval of parents.
9. Approval of society.
10. To gain honorable positions in school and elsewhere.
11. Desire for knowledge.
12. The hope of success in life.

3. *Manner of study.*
1. Should have an object.
2. Should notice facts.
3. Should write down facts.
4. Compare facts.
5. Classify facts.
6. Should make a generalization of facts.
7. Should learn to distinguish universal facts and principles.
8. Should seek for the particular principle.

- I. Study.
  - 3. *Manner of study.*
    - 9. Should demonstrate the principles.
    - 10. Should begin at the elements.
    - 11. Should pursue a logical order.
    - 12. Should study one thing at a time.
    - 13. Should study to understand.
    - 14. Should review constantly.
    - 15. Converse about what you study.
  - 4. *Character of the student.*
    - 1. They must have a desire to learn.
    - 2. They must have a high ideal.
    - 3. They must rely upon themselves.
    - 4. They must persevere.
    - 5. They must concentrate their mental forces.
    - 6. They must cultivate accuracy.
    - 7. They must have patience.
    - 8. They must continue to the end.
    - 9. They must not be proud.
- II. Recitation.
  - 1. *The Objects.*
    - 1. To estimate pupils' progress.
    - 2. For pupils to express their knowledge of the subject.
    - 3. To create self-confidence.
    - 4. To fix facts in the mind.
    - 5. For the teacher to illustrate.
    - 6. For the teacher to add new matter.
    - 7. To receive moral instructions.
    - 8. To acquire fluency of speech.
  - 2. *Requisites necessary.*
    - 1. A proper place.
    - 2. Necessary apparatus.
    - 3. Perfect order.
    - 4. Sufficient time.
    - 5. Close attention.
    - 6. Thorough knowledge of subject by the teacher.
    - 7. Books for reference.
  - 3. *Manner of conducting the recitation.*
    - 1. By lecturing, or orally.
    - 2. By the conversational method.
    - 3. By the topical method.
    - 4. By the catechetical method.
    - 5. The questions should be definite.
    - 6. The questions should be adapted to the capacity of the pupils.
    - 7. They should be logical.
    - 8. They should be exhaustive.
    - 9. They should be concise.
    - 10. They should be clear.
    - 11. They should not be direct.
    - 12. They should be adapted to the subject.
    - 13. They should be in proper language.
    - 14. The pupil should take a good position.

II. RECITATION.
- 3. *Manner of conducting the recitation.*
  - 15. The pupil should answer only what asked.
  - 16. The answer should cover the whole question.
  - 17. The answer should be correct.
  - 18. The answer should be logical.
  - 19. The answer should be understood.
  - 20. The answer should suit the question.
  - 21. The answer should be concise.
  - 22. The answer should be founded on authority.
  - 23. The answer may be in concert.
  - 24. The answer may be written.
  - 25. Errors should be corrected by the pupils.
  - 26. Errors should be corrected by the teacher.
- 4. *Preparation for Recitation.*
  - 1. By the Pupil.
    - 1. Must study lesson.
    - 2. Must study the answer.
    - 3. Must study gracefulness of position.
    - 4. Must cultivate a liking for instruction.
  - 2. By Teacher.
    - 1. Must familiarize himself with lesson.
    - 2. Arrange lesson into parts.
    - 3. Prepare proper questions.
    - 4. Arrange a plan of recitation.
    - 5. Prepare illustrations.
    - 6. Prepare apparatus.
    - 7. Must prepare his person to appear respectably before class.

III. EXERCISE.
1. Necessity for exercise.
2. Time for exercise.
3. Proper place for exercise.
4. Manner of exercise.
5. The teacher during exercise.
6. The teacher to exercise personally.
7. Gymnastics.

CHAPTER IV.—THE GOVERNMENT OF SCHOOL.

I. DUTIES OF PUPILS.
1. To themselves.
2. To one another.
3. To school property.
4. To the teacher.
5. To the school officers.
6. To the school.
7. To the visitors.
8. To the community.

II. Offences of pupils.
- 1. *Against themselves.*
  1. By injuring their property.
  2. By injuring their person.
  3. By neglecting to learn.
  4. By bad manners.
  5. By bad habits.
  6. By immorality.
- 2. *Against each other.*
  1. Theft.
  2. Destroying property.
  3. Injuring persons.
  4. Accusing falsely.
  5. Enticing to wrong.
  6. Slandering.
- 3. *Against the Property.*
  1. Destroying by accident.
  2. Destroying wilfully.
  3. Aiding in destroying property.
- 4. *Against the Teacher.*
  1. Disobedience.
  2. Disrespect.
  3. Conspiracy.
  4. Destroying property.
  5. Slandering.
- 5. *Against the School.*
  1. Evil speaking.
  2. General disobedience.
  3. Neglect to study.
  4. Irregular attendance.
  5. General wrongdoing.
- 6. *Against Society.*
  1. Disturbing the peace.
  2. Trespassing.
  3. Injuring property.
  4. Rude and disrespectful treatment of people.
- 7. *Against God.*
  1. Profanity.
  2. Immoral conduct.
  3. Vulgarity.
  4. Disrespect for religion.

III. Retribution.
- 1. *Rewards.*
  1. Approval of teacher.
  2. Approval of parents.
  3. Approval of society.
  4. Success in life.
  5. Gifts from teachers.
  6. Honorable position.
- 2. *Punishments.*
  1. Private reproof.
  2. Repairing damage.
  3. Performance of duties.
  4. Forfeiture of privileges.
  5. Acknowledgment of offence.
  6. Personal chastisement.
  7. Suspension.
  8. Expulsion.
  9. Scolding.
  10. Sarcasm.
  11. Personal indignities.
  12. Torture.

- IV. Legislation in general.
  - 1. *Means of disorder.*
    - 1. Unsuitable accommodations.
    - 2. Unqualified teachers.
    - 3. Bad management.
      - 1. Too many rules.
      - 2. Pupils not punished.
      - 3. Work not inspected.
  - 2. *Correcting disorder.*
    - 1. By punishing offenders.
    - 2. By pardoning offenders.
    - 3. By teaching what is right.
    - 4. By enforcing claims of right.
    - 5. By inspiring pupils to do right.
  - 3. *General Administration.*
    - 1. To detect offenders.
    - 2. To choose kind of punishment.
    - 3. To inflict punishment.

CHAPTER V.—SCHOOL AUTHORITIES.

- I. The school officers.
- II. The people in general.
  - 1. The family.
  - 2. The church.
  - 3. The community.
  - 4. The State.
- III. The teacher.
  - 1. *Must have a pure motive.*
  - 2. *Must be well qualified.*
    - 1. Physically.
    - 2. Intellectually.
    - 3. Morally.
    - 4. Professionally.
  - 3. *Must have a proper idea of work.*
  - 4. *Must have a knowledge of the human mind.*
  - 5. *Must be proficient in educational means.*
  - 6. *Must be thorough in the science of teaching.*
  - 7. *Must be skilled in government.*
  - 8. *Must be thorough in discipline.*
  - 9. *Must understand the wants of pupils.*
    - 1. Physical.
    - 2. Intellectual.
    - 3. Moral.
  - 10. *Must understand his relation to the profession.*
    - 1. Should be a thorough scholar.
    - 2. Should be a dignified gentleman or lady.
    - 3. Should make professional improvement.
    - 4. Should aid his fellow-teachers.
  - 11. *Must appreciate his responsibilities.*
    - 1. For the bodily health of pupils.
    - 2. For their intellectual growth.
    - 3. For their moral training.
    - 4. For their habits.

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Press of The Standard Printing and Publishing Company, New York.

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